

Chapter 3

3 Description of Alternatives

NOTE TO READERS: This Preliminary Administrative Draft EIS is for Cooperating Agency review. Final formatting of tables and page breaks are not included in this version.

3.1 Introduction

This chapter describes the methodology used for development of all potential alternatives and the basis for selecting the reasonable range of alternatives which are evaluated in detail in this Environmental Impact Statement (EIS).

3.2 Approach to Identify Potential Alternatives

This EIS evaluates a range of alternatives to the No Action Alternative for the coordinated long-term operation of the Central Valley Project (CVP) and the State Water Project (SWP) in the Year 2030. The No-Action Alternative includes full implementation of the 2008 USFWS Biological Opinion (2008 USFWS BO) and the 2009 National Marine Fisheries Service (NMFS) Biological Opinion (2009 NMFS BO) Reasonable and Prudent Alternatives (RPAs), in addition to other ongoing and future programs that would be reasonably foreseeable to be implemented by 2030.

Identification of the No Action Alternative and the range of alternatives for this EIS were developed to respond to the purpose and need for the action and comments received during the scoping process and preparation of the Draft EIS, as summarized below.

3.2.1 Scoping Process

The scoping process was initiated on March 28, 2012, with the publication of the Notice of Intent in the Federal Register and continued through June 28, 2012. Five scoping meetings were held to inform the public and interested stakeholders about the project, and to solicit comments and input on the EIS. The scoping meetings were held in Madera, Diamond Bar, Sacramento, Marysville, and Los Banos, California, in April and May 2012. Many scoping comments addressed the definition and range of alternatives, as summarized below and in the Scoping Report (included as Appendix 23A of this EIS).

- Alternative South Delta operation criteria, including:
 - Changes to Old and Middle River (OMR) flow criteria from what was described in the 2008 USFWS BO and 2009 NMFS BO
 - Changes to operational criteria of CVP and SWP south Delta intakes relative to the ratio of San Joaquin River inflows to south Delta exports;

- Changes to measurement methods for OMR flow criteria related to locations of measurements and inclusion of Contra Costa Water District intakes within the calculations of OMR flows.
- Measures to benefit the survival and recovery of listed aquatic species that do not involve modifications of long-term operation of the CVP and SWP, such as improved water quality, reduction of populations of predators of listed aquatic species in the Delta, regulation of small unscreened water diversions, restoration of floodplain habitat, and provisions for levee vegetation approaches.
- Measures to improve primary productivity and food supply for salmonids and Delta Smelt (Delta Smelt and Longfin Smelt), including through increased spring outflow, reduced Delta diversions, and changes in Delta flow patterns resulting from channel modifications or changes in Delta exports that change Delta residence times for aquatic species.
- Measures to support Federal and State fish population doubling mandates and goals.
- Measures to increase opportunities for transfer of water through the Delta.
- Measures to increase water supply availability from the CVP and SWP south Delta intakes.
- Measures to reduce reliance on Delta water supplies by reducing water supply availability from the CVP and SWP south Delta intakes.
- Complete cessation of long-term operation of the CVP and SWP, including benefits related to the operation of the CVP and SWP reservoirs, such as flood management and recreational benefits.
- Measures to prioritize CVP operations of the Trinity, Sacramento, American, and Stanislaus rivers to meet in-watershed water demands, not only in accordance with existing water rights and agreements, but also for CVP water contractors specifically located within the American and Stanislaus river watersheds.
- Measures to prioritize use of Central Valley Project Improvement Act (CVPIA) restoration funds within geographic locations collected from CVP water users in those locations.

3.2.2 Concepts Identified during Preparation of the Draft EIS

As described in Chapter 23, Consultation and Coordination, status meetings were held throughout preparation of the Draft EIS with stakeholders and interested parties between 2012 and 2015. Following the scoping process, the discussions were initially focused on identification of the No Action Alternative, other bases of comparisons, and alternative concepts to the RPAs. Based upon these discussions, the development of alternatives process initially focused on identification of the No Action Alternative, and subsequently, upon development of the range of alternatives to the No Action Alternative.

3.3 Identification of the Bases of Comparison

Council on Environmental Quality (CEQ) regulations require an EIS to include evaluation of a No Action Alternative (40 CFR 1502.14). The No Action Alternative is defined as the projections of current conditions and trends into the future without implementation of alternatives. These projected conditions are defined by CEQ as “no change” from current management direction or level of management intensity.” The No Action Alternative also can be defined as “no project” in cases where a new project is proposed for implementation. However, all of the alternatives evaluated in this EIS are to continue the coordinated long-term operation of the CVP and SWP. Therefore, the definition of the No Action Alternative a continuation of the management direction and level of intensity used for this EIS.

For this EIS, the No Action Alternative is based upon the continued operation of the CVP and SWP in the same manner as occurred at the time of the publication of the Notice of Intent in March 2012. Thus, the No Action Alternative consists of the coordinated long-term operation of the CVP and SWP, including full implementation of the RPAs in the 2008 USFWS BO and 2009 NMFS BO because Reclamation provisionally accepted the BOs in 2008 and 2009, respectively, and is implementing the RPAs. The No Action Alternative also includes changes not related to the long-term operation of the CVP and SWP or implementation of the RPAs in the 2008 USFWS BO and 2009 NMFS BO, as described in subsequent sections of this chapter.

Numerous scoping comments requested that the No Action Alternative not include the RPAs in the 2008 USFWS BO and 2009 NMFS BO because, at that time, the District Court had remanded the biological opinions (BOs) back to USFWS and NMFS. The comments indicated that the EIS should include a “basis of comparison” for the alternatives that was similar to conditions prior to implementation of the RPAs. Scoping comments also indicated that a “No Action Alternative scenario” without implementation of the RPAs in the 2008 USFWS BO and 2009 NMFS BO could be used to analyze the effects of implementing the RPAs.

Because the RPAs were provisionally accepted and the No Action Alternative, represents a continuation of existing policy and management direction, the No Action Alternative includes the RPAs. However, in response to scoping comments and subsequent comments from stakeholders and interest groups; and to provide a basis for comparison of the effects of implementation of the RPAs (per the District Court’s mandate), this EIS includes a “Second Basis of Comparison” that represents a condition in 2030 without implementation of the 2008 USFWS BO and 2009 NMFS BO. All of the alternatives will be compared to the No Action Alternative and to the Second Basis of Comparison to describe the effects that could occur by 2030 under both bases of comparison.

Several of the 2009 NMFS BO RPA actions had been initiated prior to issuance of the 2009 NMFS BO; and therefore, those actions are included in the Second

Basis of Comparison, as described below. Reasonably foreseeable actions included in the No Action Alternative that are not related to the 2008 USFWS BO or 2009 NMFS BO are also included in the Second Basis of Comparison.

3.3.1 No Action Alternative

The definition of the No Action Alternative is based upon the following assumptions that are briefly described below.

- Continued long-term operation of the CVP and SWP in accordance with ongoing management policies, criteria, and regulations, including water right permits and licenses issued by the State Water Resources Control Board (SWRCB); and operational requirements of the 2008 USFWS BO and the 2009 NMFS BO.
- Implementation of existing and future actions described in the 2008 USFWS BO and 2009 NMFS BO that would occur by 2030 without implementation of the BOs.
- Implementation of existing and future actions described in the 2008 USFWS BO and 2009 NMFS BO that would not occur by 2030 without implementation of the BOs.
- Implementation of existing and future actions not described in the 2009 NMFS BO that would occur by 2030 without implementation of any alternatives considered in this EIS.

The No Action Alternative conditions assume that climate change conditions would have changed between 2015 and 2030. It is anticipated that by 2030, there will be less snowfall over the long-term average conditions and higher mean sea level elevations.

3.3.1.1 Continued Long-Term Operation of the CVP and SWP Facilities

The CVP and SWP divert water from the Sacramento River and San Joaquin River watersheds, including from the southern portion of the Sacramento–San Joaquin River Delta (Delta) for use within the watersheds and within areas located to the south and west of the Delta. The CVP and SWP facilities store water during wet periods, divert water that is surplus to the Delta needs, and re-divert CVP and/or SWP water that has been stored in upstream reservoirs for downstream uses.

The CVP and SWP are operated by Reclamation and the California Department of Water Resources (DWR), respectively, pursuant to water right permits and licenses issued by the SWRCB, the requirements of the 2008 USFWS BO and the 2009 NMFS BO, and other applicable statutory and regulatory requirements. The SWRCB permits and licenses appropriate specific quantities of water for diversion to storage, releases from that storage later in the year, and/or direct diversion. As conditions of the water right permits and licenses, the CVP and SWP are required by SWRCB to meet specific water quality, quantity, and operational criteria. In accordance with 2008 USFWS BO and the 2009 NMFS

BO, flow, temperature, salinity, and Delta export criteria are specified for the continued long-term operation of the CVP facilities and SWP Delta export facilities to avoid jeopardy to listed species and destruction or adverse modification of designated critical habitat.

Reclamation and DWR coordinate CVP and SWP operations to meet these conditions through the Coordinated Operation Agreement (COA), signed in 1986, that defines the project facilities and their water supplies, coordinates operational procedures, identifies formulas for sharing joint responsibilities for meeting Delta standards and other legal uses of water, identifies how unstored flow will be shared, establishes a framework for exchange of water and services between the CVP and SWP, and provides for periodic review of the agreement. Since 1986, facilities operations have been modified in response to regulatory requirements that were not part of the original COA assumptions or requirements. In addition, water quality and flow standards have been revised by the SWRCB since 1986, such as SWRCB Decision 1641 (D-1641) adopted in 2000. Reclamation and DWR have operational arrangements to accommodate new facilities, water quality and flow objectives, the CVPIA, SWRCB criteria, and Federal Endangered Species Act (ESA), but the COA has not been formally modified to address these operating conditions that have been implemented following adoption of COA.

The ongoing operational management policies of the CVP and SWP are anticipated to continue under the No Action Alternative. These operational assumptions are described in Appendix 3A, No Action Alternative: Central Valley Project and State Water Project Operations, and summarized in Chapter 5, Surface Water Resources and Water Supplies.

3.3.1.2 Actions in the 2008 USFWS BO and 2009 NMFS BO that Would Have Occurred without Implementation of the Biological Opinions

Several actions included in the 2008 USFWS BO and 2009 NMFS BO address items are underway in 2008 and 2009, respectively. Some of the actions are ongoing and others have been completed. Ongoing or completed actions that would be, or have been, implemented with or without the BOs, including the following actions.

- 2008 USFWS BO RPA Component 4, Habitat Restoration. In 2014, Reclamation, California Department of Fish and Wildlife (CDFW), and USFWS adopted and initiated implementation of the Suisun Marsh Habitat Management, Preservation, and Restoration Plan (Suisun Marsh Management Plan). The No Action Alternative assumes that the Suisun Marsh Management Plan will provide up to 7,000 acres of intertidal and associated subtidal habitat in the Delta and Suisun Marsh with or without implementation of the 2000 USFWS BO. This would represent up to 87 percent (7,000 of 8,000 acres of this habitat type referenced in the 2008 USFWS BO).
- 2009 NMFS BO RPA Action I.1.3, Clear Creek Spawning Gravel Augmentation. This effort was initiated in 1996 under the CVPIA Section

3406(b)(12), and is assumed to continue under the No Action Alternative with or without implementation of the 2009 NMFS BO. The Clear Creek fisheries habitat restoration program is being implemented by USFWS and Reclamation in accordance with CVPIA (Reclamation 2011a). By the year 2020 the overall goal is to provide 347,288 square feet of usable spawning habitat from Whiskeytown Dam downstream to the former McCormick-Saeltzer Dam, which is the amount that existed before construction of Whiskeytown Dam. Between 1996 and 2009, a total of approximately 130,925 tons of spawning gravel was added to the creek. The interim annual spawning gravel addition target is 25,000 tons per year, but due to a lack of funding, only an average of 9,358 tons has been placed annually since 1996 (Reclamation 2013a). In 2010, the first annual evaluation of spawning gravel implementation and monitoring was submitted to NMFS as required by the NMFS BO. In 2012, Reclamation placed 10,000 tons of spawning gravel at four locations: Guardian Rock/Below N.E.E.D. Camp, Placer Bridge, Clear Creek Crossing/Bridge, and Tule Backwater.

- 2009 NMFS BO RPA Action I.1.4, Spring Creek Temperature Control Curtain Replacement. This action was completed when the temperature control curtain was replaced in 2011, as described in Appendix 3A, No Action Alternative: Central Valley Project and State Water Project Operations.
- 2009 NMFS BO RPA Action I.2.6, Restore Battle Creek for Winter-Run, Spring-Run, and Central Valley Steelhead. The Battle Creek Salmon and Steelhead Restoration Project is under construction to re-establish approximately 42 miles of salmon and steelhead habitat on Battle Creek and an additional 6 miles of habitat on tributaries. The Project is a collaborative effort between Reclamation, USFWS, NMFS, CDFW, Pacific Gas & Electric Company (PG&E), and other groups. Prior to 2030, elements of the project will be completed including removal of five dams, installation of new fish screens and fish ladders, provisions for increased instream flows in Battle Creek, improved access roads and trails, and decommissioned power plant canals that conveyed water between tributaries. The No Action Alternative assumes implementation of this project with or without implementation of the 2009 NMFS BO.
- 2009 NMFS BO RPA Action I.3.1, Operate Red Bluff Diversion Dam with Gates Out. This action was completed when the new Red Bluff Pumping Plant began operation in 2012, and the gates no longer block the flow of water in the Sacramento River, as described in Appendix 3A, No Action Alternative: Central Valley Project and State Water Project Operations.
- 2009 NMFS BO RPA Action I.5, Funding for CVPIA Anadromous Fish Screen Program. This effort was initiated over 20 years ago under the CVPIA Section 3406(b)(21), and is assumed to continue under the No Action Alternative with or without implementation of the 2009 NMFS BO. The No Action Alternative assumes continued implementation of the program to meet the program objectives by 2030.

- 2009 NMFS BO RPA Action I.6.1, Restoration of Floodplain Habitat; and Action I.6.2, Near-Term Actions at Liberty Island/Lower Cache Slough and Lower Yolo Bypass; Action I.6.3, Lower Putah Creek Enhancements; Action I.6.4, Improvements to Lisbon Weir; and Action I.7, Reduce Migratory Delays and Loss of Salmon, Steelhead, and Sturgeon at Fremont Weir and Other Structures in the Yolo Bypass. These actions are addressed in the ongoing Yolo Bypass Salmonid Habitat Restoration and Fish Passage Implementation Plan (Implementation Plan) that has been initiated by Reclamation and DWR. The No Action Alternative assumes completion of this Implementation Plan by 2030 with or without implementation of the 2009 NMFS BO. The Implementation Plan includes an operable gate at or near the Fremont Weir and modification of the Sacramento Weir to increase the frequency and extent of floodplain inundation in the Yolo Bypass; restoration of at least 20,000 acres of floodplain rearing habitat (excluding tidally-influenced areas); and habitat enhancements in the Yolo Bypass, including measures to avoid stranding or barriers to migration. The No Action Alternative also assumes that an operable gate would be installed in or near the Fremont Weir that would allow for controlled flows from the Sacramento River into the Yolo Bypass when Sacramento River water elevations exceed approximately 17.5 feet (NAVD88). Other portions of Fremont Weir would continue to block flows into the Yolo Bypass until the Sacramento River water elevations exceed 32.8 feet (NAVD88).
- 2009 NMFS BO RPA Action II.1, Lower American River Flow Management. This effort was initiated in 2006 when Reclamation began operating in accordance with the American River Flow Management Standard (FMS), as described in Appendix 3A, No Action Alternative: Central Valley Project and State Water Project Operations. The No Action Alternative assumes continued operations under the FMS.

3.3.1.3 Actions in the 2009 NMFS BO that Would Not Have Occurred without Implementation of the Biological Opinions

Operational actions included in the 2008 USFWS BO and 2009 NMFS BO were addressed in Section 3.3.1.1, Continued Long-Term Operation of the CVP and SWP Facilities, and described in Appendix 3A, No Action Alternative: Central Valley Project and State Water Project Operations. In addition to the operational actions, there are several actions that would not have been implemented by 2030 under the No Action Alternative without implementation of the 2008 USFWS BO and 2009 NMFS BO. These actions have not been fully defined at this time; and therefore, would require future engineering and environmental evaluation prior to implementation. These following actions are assumed to be completed under the No Action Alternative, and the objectives outlined in the 2008 USFWS BO and 2009 NMFS BO are assumed to be achieved by 2030.

- 2009 NMFS BO RPA Action I.2.5, Winter-Run Passage and Re-Introduction Program at Shasta Dam.
- 2009 NMFS BO RPA Action II.3, Structural Improvements for Temperature

Management on the American River, including installation of a Folsom Dam temperature control device, methods to transport cold water through Lake Natoma, installation of a temperature control device on the El Dorado Irrigation District intake from Folsom Lake, and development of temperature management decision-support tools.

- 2009 NMFS BO RPA Action II.5, Fish Passage at Nimbus and Folsom Dams.
- 2009 NMFS BO RPA Action II.6, Implement Actions to Reduce Genetic Effects of Nimbus and Trinity River Fish Hatchery Operations.
- 2009 NMFS BO RPA Action III.2.1, Increase and Improve Quality of Spawning Habitat with Addition of 50,000 Cubic Yards of Gravel by 2014 and with a Minimum Addition of 8,000 Cubic Yards per Year for the Duration of the Project Actions on Stanislaus River.
- 2009 NMFS BO RPA Action III.2.2, Conduct Floodplain Restoration and Inundation Flows in Winter or Spring to Inundate Steelhead Juvenile Rearing Habitat on One- to Three-Year Schedule on Stanislaus River.
- 2009 NMFS BO RPA Action III.2.3, Restore Freshwater Migratory Habitat for Juvenile Steelhead by Implementing Projects to Increase Floodplain Connectivity and to Reduce Predation Risk During Migration on Stanislaus River.
- 2009 NMFS BO RPA Action III.2.4, Fish Passage at New Melones, Tulloch, and Goodwin Dams.
- 2009 NMFS BO RPA Action IV.4, Tracy Fish Collection Facility Improvements to Reduce Pre-Screen Loss and Improve Screening Efficiency.
- 2009 NMFS BO RPA Action IV.4.2 Skinner Fish Collection Facility Improvements to Reduce Pre-Screen Loss and Improve Screening Efficiency.
- 2009 NMFS BO RPA Action IV.4.3 Tracy Fish Collection Facility and the Skinner Fish Collection Facility Actions to Improve Salvage Monitoring, Reporting and Release Survival Rates.

3.3.1.4 Future Actions not included in the 2008 USFWS BO and 2009 NMFS BO that Would Have Occurred without Implementation of the Biological Opinions

The No Action Alternative also includes assumptions unrelated to implementation of the 2008 USFWS BO and 2009 NMFS BO, including: climate change and sea level rise; development of lands in accordance with general plans in areas served by CVP and SWP water supplies; and reasonable and foreseeable projects that have been approved and are anticipated to be implemented by 2030.

3.3.1.4.1 Climate Change and Sea Level Rise

Under Section 9503 of the SECURE Water Act (Public Law 111-11, Subtitle F), Reclamation conducted a comprehensive assessment of current information on potential future climate change impacts and implications for long-term water

management in the West, as described in Appendix 5A, Modeling Methodology. Projections of future climate in the Sacramento and San Joaquin River basins are summarized, with regard to temperature, precipitation, snowpack, and runoff. Results indicate that temperatures across both river basins may increase steadily, with the basin-average mean annual temperature projected to increase by roughly 5° to 6° Fahrenheit (F) during the 21st century. Annual precipitation in the basins should remain geographically variable over the next century, with current projections suggesting that annual basin-wide precipitation may initially stay steady to slightly increasing, to an eventual slight decrease over the region. With regard to snowpack, increased warming is expected to diminish snow accumulation during the cool season and reduce the availability of snowmelt to sustain runoff during the warm season. Reductions in annual runoff are predicted to occur by the latter half of the century. Changes in runoff seasonality are generally projected, with warming leading to more rainfall and runoff in the cool season and less runoff during the spring, affecting seasonal water supplies. One difficulty that arises in taking climate change into account in long-term water resources planning is that the natural variability is often greater than the magnitude of change expected over several decades.

Global and regional sea levels have been increasing steadily over the past century and are expected to continue to increase throughout this century (BCDC 2011). The National Research Council recently released a study of sea level rise on the west coast. Key results indicate that global sea level has risen about 7 inches in the 20th century and the rate of sea level rise is accelerating (NRC 2012). Relative to year 2000 levels, global sea level is projected to rise 3 to 9 inches by 2030, 7 to 19 inches by 2050, and 20 to 55 inches by 2100. Sea level rise along the California coast south of Cape Mendocino are projected to show even greater ranges of potential change. As a result, sea level rise associated with climate change will continue to threaten coastal lands and infrastructure, increase flooding at the mouths of rivers, place additional stress on levees and water resources in the Delta.

3.3.1.4.2 General Plan Development in CVP and SWP Service Areas

Counties and cities throughout California have adopted general plans which identify land use classifications including those for municipal and industrial uses and those for agricultural uses. Preparation of general plans includes an environmental evaluation under the California Environmental Quality Act to identify adverse impacts to the physical environment and to provide mitigation measures to reduce those impacts to a level of less than significance. Most of the counties where CVP and SWP water supplies are delivered have adopted general plans following the environmental review of the plans and appropriate alternatives. Population projections from those general plan evaluations are provided to the State Department of Finance and are used to project future water needs and the potential for conversion of existing undeveloped lands and agricultural lands. Many of the existing general plans for counties with municipal areas recently have been modified to include land use and population projections

through 2030. The No Action Alternative assumes that land uses, as described in Chapter 13, Land Use, will develop through 2030 in accordance with existing general plans.

3.3.1.4.3 Continued Implementation of Ongoing Federal, State, and Local Water Resources Policies

The No Action Alternative assumes continued implementation of ongoing water resources policies and programs that are not addressed in the 2008 USFWS BO and 2009 NMFS BO, including the following programs.

- Federal Clean Water Act, including completion of Total Maximum Daily Load programs, National Pollutant Discharge Elimination System permits, and Waste Discharge Permits, as described in Chapter 6, Surface Water Quality.
- SWRCB water rights and water quality policies and programs, as described in Chapter 5, Surface Water Resources and Water Supplies.
- Federal Safe Drinking Water Act and California Safe Drinking Water Act policies and programs related to drinking water treatment requirements, as described in Chapter 6, Surface Water Quality.
- Federal Clean Air Act and California Clean Air Act, including completion of the compliance programs in accordance with the State Implementation Plans, as described in Chapter 16, Air Quality and Greenhouse Gas Emissions.
- Flood management policies and programs established by the U.S. Army Corps of Engineers (USACE), Federal Emergency Management Agency, DWR, Central Valley Flood Protection Board, and local flood management agencies, as described in Chapter 5, Surface Water Resources and Water Supplies.

3.3.1.4.4 Reasonable and Foreseeable Projects and Programs

The No Action Alternative assumes continued implementation of existing projects and facilities, including water supply and wastewater management facilities, flood management facilities, and recreational facilities. In addition, the No Action Alternative assumes implementation of the following ongoing projects by 2030. These project descriptions are organized geographically from north to south in the State of California.

Trinity River Restoration Program

The Trinity River Restoration Program is conducted by eight partners that form the Trinity Management Council, including Reclamation, USFWS, NMFS, U.S. Forest Service, Hoopa Valley Tribe, Yurok Tribe, California Resources Agency, and Trinity County. The Trinity River Flow Evaluation Final Report was adopted in 1999 and the Trinity River Record of Decision (ROD) was signed in 2000 to implement restoration of the physical processes and rehabilitate the Trinity River as foundation for fisheries recovery. The ROD described four restoration methods (flow management through releases from Lewiston Dam, construction of channel rehabilitation sites, augmentation of gravels, and control of fine

sediments); infrastructure improvements to accommodate high flow releases from Lewiston Dam; environmental compliance with improvements to riparian vegetation and wetlands, reduced turbidity, and improved water temperatures; and science-based adaptive management. The Trinity River Restoration Program 2011 Annual Report indicated that about half of the projects described in the Flow Evaluation Study had been completed and intensive assessments of the physical responses of the Trinity River and geomorphic assessments of the 40-mile restoration reach had been initiated (TRRP 2012). This project will improve conditions for aquatic species in the Trinity River.

Continued Implementation of the Central Valley Project Improvement Act Provisions

In 1992, the CVPIA (Title 34 of Public Law 102-575) was adopted to include fish and wildlife protection, restoration, enhancement, and mitigation as purposes of the CVP having equal priority with irrigation and domestic water supply uses, and power generation. The purpose of the CVPIA is expressed in six broad statements found in Section 3402 of the Act:

- To protect, restore, and enhance fish, wildlife, and associated habitats in the Central Valley and Trinity River basins of California;
- To address impacts of the CVP on fish, wildlife, and associated habitats;
- To improve the CVP's operational flexibility;
- To increase water-related benefits provided by the CVP to the state through expanded use of voluntary water transfers and improved water conservation;
- To contribute to the state's interim and long-term efforts to protect the San Francisco Bay/Sacramento-San Joaquin Delta Estuary;
- To achieve a reasonable balance among competing demands for use of CVP water, including the requirements of fish and wildlife, agricultural, municipal and industrial, and power contractors.

The Secretary of the Department of the Interior (DOI) assigned primary responsibility for implementing CVPIA's many provisions to Reclamation and USFWS. Reclamation and USFWS coordinate with other federal agencies, tribes, the State of California, and numerous partners and stakeholders during each fiscal year to plan and implement activities.

The current focus of the CVPIA Program is on fish and wildlife restoration, water management, and conservation activities, authorized in Sections 3406 and 3408 of the Act. These goals fit within four broad resource areas: Fisheries, Water Operations, Refuges and Other Resources (Reclamation 2013c).

The Fisheries Resource Area includes actions to implement the CVPIA "fish-doubling goal" for Chinook Salmon, Rainbow Trout (steelhead), Striped Bass, American Shad, White Sturgeon and Green Sturgeon. The 2001 Final Restoration Plan to implement the CVPIA included 289 actions and evaluations that were determined to be reasonable given numerous technical, legal and implementation

considerations. Reclamation and USFWS are implementing these and related actions (Reclamation 2013c). In 2008, the CVPIA Program conducted an independent review of the status of actions to achieve the fish-doubling goal. Following the review, a revised plan was developed to emphasize managing all of the fisheries programs as one program instead of individual actions; utilize a science-based management framework to address problems at a system level; report accomplishments by watershed; and improve transparency by communicating the coordination and decision-making that occurs within the program. The No Action Alternative assumes that the CVPIA Program will continue to be implemented in 2030.

The Water Operations Resource Area includes provisions to supply CVP water to resource locations in flow, quantity, velocity, and timing patterns that would contribute to the biological resources in accordance with Section 3406(b) of CVPIA (Reclamation 2013c). The No Action Alternative assumes that water operations will continue to include measures identified in Section 3406(b).

The Refuges Resources Area includes actions to contribute to the maintenance, restoration and enhancements of wetlands and waterfowl habitat either directly or through contractual agreements with other appropriate parties, firm water supplies of suitable quality to maintain and improve wetland habitat areas on 19 federal, state and private lands. The CVPIA requires Reclamation to provide CVP water to meet “Level 2” water demands and to obtain water supplies to meet “Level 4” water demands (Reclamation 2013c). In 2009, the CVPIA Program conducted an independent review of the refuge water supply program. The report indicated that Level 2 water supplies had become more reliable under CVPIA; however, Level 4 water supplies were not fully obtained. In response, Reclamation entered into an agreement with USFWS and the National Fish and Wildlife Foundation to explore avenues to improve the effectiveness of the water acquisitions, including those for Incremental Level 4; assessed ways to increase the priority for pumping, conveyance and storage of Incremental Level 4 water supplies in CVP facilities; and continued planning for external storage and conveyance facilities to meet refuge water supply needs. The No Action Alternative assumes that refuge water supplies will continue to be provided in 2030.

The Other Resource Area actions are related to terrestrial habitat and species; and water quality and conservation. One of the programs implemented in this resource area includes the Section 3406(b)(1) “other” Habitat Restoration Program, which focuses on protecting native habitats that have been directly and indirectly affected by the CVP’s construction and operation (Reclamation 2013c). This is accomplished through the purchase of fee title or conservation easements on lands where threats are significant and restoring lands to native habitat. Another program is the Land Retirement Program, Section 3408 (h), to purchase and retire land from agricultural production to improve water quality and provide for terrestrial habitat restoration. The No Action Alternative assumes that these actions will continue in a manner similar to ongoing operations.

DOI is continuing to implement CVPIA using an improved science-based

decision making process using a scientific framework that connects restoration actions to environmental and population responses across watersheds (Reclamation 2013c). A system-wide science-based approach with performance indices, monitoring, and scientific review of results is used to provide direction as the CVPIA adapts to changing conditions.

Clear Creek Mercury Abatement and Fisheries Restoration Project

The Lower Clear Creek Aquatic Habitat and Waste Discharge Improvement Project was initiated to remove the long-term impacts of mercury contamination in Lower Clear Creek and to create over 5 acres of new wetlands. The mercury sources are dredge-mined tailings from more than 200 historic gold and gravel mines in the watershed. The tailings are located on the properties adjacent to Clear Creek and in gravels historically used for spawning gravel supplementation. This is being completed in accordance with CVPIA actions (WSRCD 2011). This project will improve conditions for aquatic species in Clear Creek and the upper Sacramento River.

Iron Mountain Mine Superfund Site

The Iron Mountain Mine Superfund Site on Spring Creek had discharged acid mine drainage into several creeks that are tributary to Keswick Reservoir and the Sacramento River since the late 1890s. The interim remedies include source control, acid mine drainage collection and treatment, and water management, including water diversions and coordinated releases of contaminated surface water from Spring Creek Debris Dam with dilution flows released from the Spring Creek power plant and Shasta Lake. In 2008, the U.S. Environmental Protection Agency indicated that the interim remedies were operational and had reduced metal loading discharges by 95 percent as compared to pre-project conditions. A final restoration plan for natural resources injured by Iron Mountain Mine operation was adopted in 2002 by USFWS, CDFW, National Oceanic and Atmospheric Administration, Bureau of Land Management, and Reclamation and those programs are being implemented (USEPA 2008). This project will improve water quality and conditions for aquatic species in Spring Creek and the upper Sacramento River.

Mainstem Sacramento River and American River Gravel Augmentation Programs

The Mainstem Sacramento Gravel Augmentation Program is an ongoing Reclamation project that helps meet requirements of Section 3406 (b)(13) of the CVPIA to restore and replenish spawning gravel and rearing habitat for salmonid species. Reclamation began placing salmonid spawning gravel in the Sacramento River approximately 0.25 miles downstream of Keswick Dam in 1997 and subsequently in Salt Creek. The project will place approximately 5,000 tons of gravel into the river and implement riffle supplementation/side-channel excavation to help improve spawning habitat for Chinook Salmon and steelhead (Reclamation and USFWS 2012). This project will improve conditions for aquatic species in the upper Sacramento River.

The Lower American River Salmonid Spawning Gravel Augmentation and Side-Channel Habitat Establishment Program to increase and improve salmon and

steelhead spawning and rearing habitat by replenishing spawning gravel and establishing additional side-channel habitat at new restoration sites along the lower American River between Nimbus Dam and Upper Sunrise Recreation Area and at Arden Rapids. Gravel augmentation, side channel excavation, and incorporation of woody material into the main channel to improve Chinook Salmon and steelhead spawning and rearing habitat (Reclamation 2008, 2014e).

Nimbus Fish Hatchery Fish Passage Project

A fish passageway from the Nimbus Fish Hatchery to the stilling basin downstream of the Nimbus Dam will be constructed and the diversion weir will be removed. This project will create and maintain a reliable system for collecting adult fish to allow Reclamation to mitigate for loss of access to spawning areas following construction of Nimbus Dam and adequately protect Chinook Salmon and Central Valley steelhead. The project is scheduled to start in 2018 if adequate funding is appropriated. This project will improve conditions for aquatic species in the lower American River and lower Sacramento River.

Folsom Dam Water Control Manual Update

The USACE is developing and evaluating alternatives to change flood management operations of Folsom Dam and Folsom Lake to reduce flood risk to the Sacramento area. Currently, the USACE is completing construction of the new auxiliary spillway at Folsom Dam and is completing an in-depth analysis of recent hydrologic data for the American River watershed upstream of Folsom Dam. The study will result in an updated Water Control Manual following completion of an EIS and an engineering report (USACE et al. 2012). This project could change flow patterns in the American and Sacramento rivers and the Delta.

Federal Energy Regulatory Commission Relicensing for Middle Fork of the American River Project

The Federal Energy Regulatory Commission (FERC) completed a final EIS for the relicensing of the Placer County Water Agency existing 223,753 kilowatt Middle Fork American River Hydroelectric Project. The project is located on the Middle Fork of the American River, Rubicon River, and Duncan and North and South Fork Long Canyon creeks in Placer and El Dorado counties. The relicensing will provide for continued operation of the project with increased pulse and minimum instream flow releases, defined ramping rates, whitewater boating flow releases, protection of sensitive species, maintenance and enhancement of recreation opportunities, erosion and sedimentation reduction measures, vegetation improvement plans, and recreation management plans (FERC 2012). This project will change flow patterns in the American River and improve conditions for aquatic species in portions of the American River watershed.

Lower Mokelumne River Spawning Habitat Improvement Project

The Mokelumne River is tributary to the Delta and supports five species of anadromous fish. The proposed project will initially include placement of 4,000 to 5,000 cubic yards of suitably sized salmonid spawning gravel annually for a 3-

year period at two specific sites, and then provide annual supplementation of 600 to 1,000 cubic yards thereafter. Fall-run Chinook Salmon and steelhead are the primary management focus in the river. Availability of spawning gravel in this section of the Mokelumne River has been determined to be deficient because historic gold and aggregate mining operations removed gravel annually and upstream dams have reduced gravel transport to the area. This area was chosen because it is known to have supported fall-run Chinook Salmon and steelhead spawning in the past and because the substrate is suitable for habitat improvement (USFWS 2009).

This project will improve conditions for aquatic species in the Mokelumne and San Joaquin rivers.

Dutch Slough Tidal Marsh Restoration

The Dutch Slough Tidal Marsh Restoration Project, located near Oakley in Eastern Contra Costa County, will restore wetland and uplands, and provide public access to the 1,200-acre Dutch Slough property. The property is composed of three parcels separated by narrow man-made sloughs. The project is a cooperative partnership between DWR, State Coastal Conservancy, CDFW, City of Oakley, Ironhouse Sanitary District, Reclamation Districts 2137 and 799, Natural Heritage Institute, and landowners. The project will provide ecosystem benefits, including habitat for sensitive species, including winter-run Chinook Salmon Sacramento splittail, and many waterfowl species. It also will be designed and implemented to maximize opportunities to assess the development of those habitats and measure ecosystem responses so that future Delta restoration projects will be more successful. DWR approved the Final Environmental Impact Report (EIR) for the project in March 2010 (NMFS 2013). This project will improve conditions for aquatic and terrestrial species in the Delta through tidal marsh restoration.

Suisun Marsh Habitat Management, Preservation, and Restoration Plan Implementation

On March 2, 1987, the Suisun Marsh Preservation Agreement (SMPA) was signed by DWR, CDFW, Reclamation, and the Suisun Resource Conservation District. The purpose of the agreement was to establish mitigation for impacts on salinity from the SWP, CVP, and other upstream diversions. The SMPA contains provisions for Reclamation and DWR to mitigate the adverse effects on Suisun Marsh channel water salinity from operation of the CVP and SWP and other upstream diversions. The Suisun Marsh Habitat Management, Preservation and Restoration Plan (SMP) was completed in 2014 under the direction of Reclamation, USFWS, CDFW, NMFS, Suisun Resource Conservation District, and CALFED Bay-Delta Program (the Principal Agencies). This group was assisted by regulatory agencies such as the USACE, Bay Conservation and Development Commission, SWRCB, and the San Francisco Bay Regional Water Quality Control Board. The following actions will be implemented under the plan (Reclamation 2014a).

- Restoration of up to 7,000 acres of tidal marsh and protection and

enhancement of up to 46,000 acres of managed wetlands through dredging, erosion protection, and installation of fish screens.

- Increased frequency of currently implemented managed wetlands activities.
- Implementation of the Preservation Agreement Implementation Fund (PAI Fund) to improve managed wetland flood and drain capabilities to accommodate high salinity water while maintaining functions and values of managed wetland habitats.

The plan includes environmental commitments and mitigation measures, an adaptive management program, and reporting through annual reports over the 30-year time frame of the plan. This project will improve conditions for aquatic and terrestrial species in the Delta and Suisun Marsh.

Tidal Wetland Restoration in the Delta and Suisun Marsh

In addition to tidal wetlands restoration that would occur in the Suisun Marsh, several programs are being implemented in the Cache Slough portion of the Delta. The 2008 USFWS BO RPA required a program to create or restore a minimum of 8,000 acres of intertidal and associated subtidal habitat in the Delta and Suisun Marsh. As described above, up to 7,000 acres of tidal marsh restoration would occur under the SMP. Other programs have been initiated to restore or expand tidal wetlands, and could provide an additional 3,000 acres of tidal wetlands in the Delta and Suisun Marsh. This additional 3,000 acres could be completed in accordance with the 2008 USFWS BO requirements. The No Action Alternative includes the following restoration programs.

- Yolo Ranch (initial phase), Northwest Field Network 4, and Flyway Farms – 941 and 405 acres, respectively, of tidal influenced lands (SFWCA 2011, 2013).
- Northern Liberty Island Fish Restoration Project – 737 acres (RD 2093 2011).
- Prospect Island Restoration Project – 1,170 acres (based on maps included in CDFW and DWR 2013).
- Calhoun Cut/Lindsey Slough Tidal Habitat Restoration Project – 87 acres (CDFW 2015).

San Joaquin River Restoration Program

The San Joaquin River Restoration Program is a comprehensive long-term effort to restore flows to the San Joaquin River from Friant Dam to the confluence of Merced River and restore a self-sustaining Chinook Salmon fishery in the river while reducing or avoiding adverse water supply impacts from restoration flows. The restoration program is the product of more than 18 years of litigation, which culminated in a Stipulation of Settlement on the lawsuit known as *NRDC, et al., v. Kirk Rodgers, et al.* The settling parties reached agreement on the terms and conditions of the settlement, which was subsequently approved by the District Court on October 23, 2006. The settling parties include the Natural Resources Defense Council, Friant Water Users Authority, and the U.S. Departments of the Interior and of Commerce. The settlement's two primary goals are to:

- Restore and maintain fish populations in "good condition" in the main stem of the San Joaquin River below Friant Dam to the confluence of the Merced River, including naturally reproducing and self-sustaining populations of salmon and other fish, and
- Reduce or avoid adverse water supply impacts to all of the Friant Division long-term contractors that may result from the Interim Flows and Restoration Flows provided for in the settlement.

The settlement requires specific releases of water from Friant Dam to the confluence of the Merced River, which are designed primarily to meet the various life stage needs for spring- and fall-run Chinook Salmon. The release schedule assumes continuation of the current average Friant Dam release of 116,741 acre-feet, annually, with specific flow requirements depending on the year type. The project was authorized and funded with the passage of San Joaquin River Restoration Settlement Act, part of the Omnibus Public Land Management Act of 2009 (Public Law 111-11). Interim flows began in October, 2009. There are many physical improvements within and near the San Joaquin River that will be undertaken to fully achieve the river restoration goal. The improvements will occur in two separate phases that will focus on a combination of water releases from Friant Dam, as well as structural and channel improvements (Reclamation 2012). This project will improve conditions for aquatic and terrestrial species in the San Joaquin River and the Delta.

This EIS does not address the CVP facilities associated with Millerton Lake, including the Madera and Friant-Kern canals and their service areas, and the San Joaquin River Restoration Program because these facilities are not considered in the consultations related to the 2008 USFWS BO and 2009 NMFS BO.

Stockton Deep Water Ship Channel Demonstration Dissolved Oxygen Project

The Stockton Deep Water Ship Channel Demonstration Dissolved Oxygen Project is a multiple-year study of the effectiveness of elevating dissolved oxygen (DO) concentrations in the channel. The DO concentrations drop as low as 2 to 3 milligrams per liter (mg/L) during warmer and lower water flow periods in the San Joaquin River. The low DO levels can adversely affect aquatic life including the health and migration behavior of anadromous fish (e.g., salmon). The objective of the study is to maintain DO levels above the minimum recommended levels specified in the 2006 Water Quality Control Plan (Basin Plan) for the Sacramento River and San Joaquin River basins, as described in Chapter 6, Surface Water Quality.

The project's full-scale aeration system includes two 200-foot-deep u-tube aeration tubes; two vertical turbine pumps capable of pumping over 11,000 gallons of water each; a liquid-to-gas oxygen supply system; and numerous pieces of ancillary equipment and control systems. The system has been sized to deliver approximately 10,000 pounds of oxygen per day into the Deep Water Ship Channel. The aeration system is anticipated to be operated only when channel DO levels are below the Basin Plan DO water quality objectives (approximately

100 days per year). The project study includes an on-going assessment of DO levels in the channel and vicinity and a study of potential adverse effects of low DO on salmon (DWR 2010a). This project will improve water quality in the central and south Delta as compared to historical conditions.

Grassland Bypass Project

The purposes and objectives of the Grassland Bypass Project, 2010–2019, are to: 1) extend the San Luis Drain Use Agreement in order to allow the Grassland Basin Drainers time to acquire funds and develop feasible drainwater treatment technology to meet revised Basin Plan objectives and Waste Discharge Requirements by December 31, 2019; 2) continue the separation of unusable agricultural drainage water discharged from the Grassland Drainage Area from wetland water supply conveyance channels for the period 2010–2019; and 3) facilitate drainage management that maintains the viability of agriculture in the project area and promotes continuous improvement in water quality in the San Joaquin River. All discharges of drainage water from the Grassland Drainage Area into wetlands and refuges have been eliminated. The selenium load discharged from the Grassland Drainage Area has been reduced by 61 percent (from 9,600 pounds to 3,700 pounds) and the salt load has been reduced by 39 percent (from 187,300 tons to 113,600 tons). Prior to the project, the monthly mean concentration of selenium in Salt Slough was 16 parts per billion. Since implementation of this project, the concentration has been less than the water quality objective of 2 parts per billion. The drainage water is conveyed to Mud Slough. Grasslands Water District and others are currently evaluating alternative plans to comply with Central Valley Regional Water Quality Control Board water quality objectives for selenium and salinity in the San Joaquin River at the end of this project in 2019. One of the alternatives could be zero discharge with complete recycle of the drainwater to salinity-tolerant crops (Reclamation 2009). This project will improve water quality in the San Joaquin River and the central and south Delta.

Central Valley Salinity Alternatives for Long-Term Sustainability (CV-SALTS)

In 2006, the Central Valley Regional Water Quality Control Board, the SWRCB, and stakeholders began a joint effort to address salinity and nitrate problems in California's Central Valley and adopt long-term solutions that will lead to enhanced water quality and economic sustainability. This effort is referred to as the Central Valley Salinity Alternatives for Long-term Sustainability (CV-SALTS) Initiative. The goal of CV-SALTS is to develop a comprehensive region-wide Salt and Nitrate Management Plan (SNMP) describing a water quality protection strategy that will be implemented through a mix of voluntary and regulatory efforts. The SNMP may include recommendations for numeric water quality objectives, beneficial use designation refinements, and/or other refinements, enhancements, or basin plan revisions.

The SNMP will serve as the basis for amendments to the three Basin Plans that cover the Central Valley Region (Sacramento River and San Joaquin River Basin Plan, the Tulare Lake Basin Plan and the Sacramento/San Joaquin Rivers

Bay-Delta Plan). The basin plan "amendments" will likely establish a comprehensive implementation plan to achieve water quality objectives for salinity (including nitrate) in the Region's surface waters and groundwater. The SNMP may include recommendations for numeric water quality objectives, beneficial use designation refinements, and/or other refinements, enhancements, or basin plan revisions (CVRWQCB 2015). This project could change water quality and flow patterns in the San Joaquin River.

Municipal Water Supply Projects

Municipal water users in California are required to prepare Urban Water Management Plans (UWMPs) in accordance with the California Urban Water Management Planning Act of 1983. The State Water Conservation Act of 2009 (also known as SBx7-7) required the UWMPs to identify the water demands and water supplies for their service area through the year 2030, and to provide a plan to reduce statewide per capita water use by 20 percent by the year 2020. All of the UWMPs identify conservation measures to reduce water demands by 2020. Many of the UWMPs identify projects that are being planned or implemented to meet water demands in 2030. Water resources projects that have been approved and are being implemented are assumed to be complete by 2030 under the No Action Alternative. There are over 50 projects considered in the study area to be included in the No Action Alternative, including the following major water supply projects.

- Cambria Emergency Water Supply Project desalination project (CCSD 2014).
- Carlsbad Metropolitan Water District water recycling project (Carlsbad MWD 2012)
- Central Basin Municipal Water District Southeast Water Reliability Project (CBMWD 2011).
- City of Los Angeles Department of Water and Power groundwater recharge projects (City of Los Angeles 2011, 2013a).
- City of Oxnard GREAT Program Desalter (City of Oxnard 2013).
- Eastern Municipal Water District water recycling programs (EMWD 2014a, 2014b).
- Fresno Irrigation District groundwater recharge projects (FID 2015).
- Inland Empire Utilities Agency groundwater recharge projects (IEUA 2015).
- Kern County and Antelope Valley-East Kern Water Agency (AVEK 2011).
- Los Angeles County Sanitation Districts expansion of water recycling programs (LACSD 2005).
- San Benito County Water District expansion of water treatment plant to treat CVP water (SBCWD 2014).
- San Diego County Water Authority Carlsbad Seawater Desalination Facility (SDCWA 2014).

- Santa Barbara desalination water treatment plant (KEYT 2015).
- Santa Clara Valley Water District wastewater recycling projects (SCVWD 2012).
- Victor Valley Wastewater Reclamation Authority water recycling programs (VWVRA 2015).
- Water Replenishment District Groundwater Reliability Improvement Program and water recycling programs (WRD 2012, 2015).
- West Basin Municipal Water District recycling water programs (WBMWD 2011).
- Western Development and Storage Antelope Valley Water Bank (Reclamation 2010).
- Western Municipal Water District Arlington Desalter Expansion to use saline groundwater (WMD 2015).
- Woodland-Davis Clean Water Agency water treatment plant (WDCWA 2013).

Water Transfer Projects

Water transfer programs have been used historically throughout California, especially among CVP water users to meet both irrigation and municipal water demands either during drought or to replenish stored surface water or groundwater during wet periods (Reclamation 2013b).

Implementation of CVPIA in 1992 facilitated water transfers between CVP water users and between CVP water users and non-CVP water users. The water can be transferred through CVP facilities in a manner that does not harm the operation of the CVP for other users and beneficial uses. CVP facilities also can be used to convey non-CVP water under the Warren Act of 1911. In the first 10 years following adoption of CVPIA, more than 4.3 million acre-feet of water was transferred for agricultural and municipal water uses and more than 396,000 acre-feet was transferred to the DOI for Level 4 Refuge Water Supplies (Reclamation 2004). Water transfers also occur between the SWP water users and non-SWP water users. SWP facilities can be used to convey the transferred water, including non-SWP water, under DWR conveyance agreements.

Historically, water transfers primarily were in-basin transfers (e.g., Sacramento Valley water seller to Sacramento Valley water user) (Reclamation 2013b; DWR, Reclamation, USFWS and NMFS 2013). However, between 2001 and 2012, water transfers from the Sacramento Valley to the areas located south of the Delta of up to 298,806 acre-feet occurred (not including water transfers under the Environmental Water Account Program in the early 2000s) (DWR, Reclamation, USFWS and NMFS 2013). These transfers occurred in drier years. In 2012 and 2013, the following types of water transfers occurred (DWR and SWRCB 2014).

- Water transfers involving CVP and SWP water:

- 2012: 47,420 acre-feet of water transfers (43 percent were between agricultural water users, 36 percent were between municipal water users, and 21 percent were between agricultural and municipal water users).
- 2013: 63,790 acre-feet of water transfers (28 percent were between agricultural water users, and 72 percent were between agricultural and municipal water users).
- Water transfers involving non-CVP and SWP water:
 - 2012: 188,074 acre-feet of water transfers (72 percent were between agricultural water users, 14 percent were from agricultural water users to wildlife refuges, and 14 percent were between agricultural and municipal water users).
 - 2013: 268,370 acre-feet of water transfers (72 percent were between agricultural water users, 1 percent were from agricultural water users to wildlife refuges, and 27 percent were between agricultural and municipal water users).

Until recently, most of the water transfers extended for one or two years. In 2008, one of the first long-term water transfer agreements was approved by the SWRCB for the Lower Yuba River Accord. The plan was designed to protect and enhance fisheries resources in the Lower Yuba River, increase local water supply reliability, provide DWR with increased operational flexibility for protection of Delta fisheries resources, and provide added dry-year water supplies to CVP and SWP water users, as described in Appendix 3A, No Action Alternative: Central Valley Project and State Water Project Operations. In 2013, Reclamation approved an overall program for a 25-year period (2014 to 2038) to transfer up to 150,000 acre-feet/year of water from the San Joaquin River Exchange Contractors Water Authority to DOI for refuge water supplies or CVP and SWP water users (Reclamation 2013b). Reclamation is currently evaluating a long-term water transfer program (2015 to 2024) between water sellers in the Sacramento Valley and water users located in the San Francisco Bay Area and south of the Delta (Reclamation 2014b).

Transfer programs generally involve annual crop changes using temporary crop idling or shifting, release of stored water in reservoirs on different patterns for the purchasers' water demands, and/or groundwater substitution (DWR and Reclamation 2014). The transfers must be approved by the CVP and/or SWP if the transfer involves CVP or SWP water or utilizes CVP or SWP facilities. Except for water transfers among CVP water users, water transfers also require approval from the SWRCB. Environmental documentation is required for all water transfers involving CVP and/or SWP water supplies or facilities. Under State law, water transfers cannot result in injury to other legal users of water; unreasonable impacts on fish and wildlife and instream uses; and unreasonable economic or environmental impact on the county in which the transfer water originates.

It is assumed that transfers would continue under the No Action Alternative in a

similar manner as have occurred for the past 10 years. It is anticipated that the number of long-term transfer agreements could increase to facilitate annual decisions for water transfers. However, the conditions for each water transfer would be determined on a case-by-case basis

3.3.2 Second Basis of Comparison

Numerous comments received during the scoping process and subsequently during preparation of the Draft EIS requested that the No Action Alternative not include the 2008 USFWS BO RPA and 2009 NMFS BO RPA. The comments indicated that the EIS should include a “basis of comparison” for the alternatives that was similar to conditions prior to implementation of the RPAs. Scoping comments also indicated that a “No Action Alternative scenario” without implementation of the RPAs in the 2008 USFWS BO and 2009 NMFS BO could be used to analyze the effects of implementing the RPAs.

Reclamation has provisionally accepted and implemented the 2008 USFWS BO and 2009 NMFS BO actions, the No Action Alternative, by definition, must include these actions because they represent a continuation of existing policy and management actions. In response to the comments and to provide a basis for comparison of the effects of implementation of the RPAs (per the District Court’s mandate), this EIS includes a “Second Basis of Comparison” that does not include implementation of the RPAs. The Second Basis of Comparison can be used as a basis of comparison for the alternatives that do not include the RPAs. In this way, the action alternatives can be compared against both the No Action Alternative and the Second Basis of Comparison.

The definition of the Second Basis of Comparison is based upon the following assumptions that are briefly described below.

- Continued long-term operation of the CVP and SWP in accordance with ongoing management policies, criteria, and regulations, including water right permits and licenses issued by the SWRCB; without the operational requirements of the 2008 USFWS BO and the 2009 NMFS BO.
- Implementation of existing and future actions described in the 2008 USFWS BO and 2009 NMFS BO that would occur by 2030 without implementation of the BOs.
- Implementation of future actions not described in the 2009 NMFS BO that would occur by 2030 without implementation of any alternatives considered in this EIS.

The Second Basis of Comparison would not include implementation of future actions described in the 2008 USFWS BO and 2009 NMFS BO that would not occur by 2030 without implementation of the BOs.

The Second Basis of Comparison conditions assume that climate change conditions would have changed between 2015 and 2030 as described under the No Action Alternative. It is anticipated that by 2030, there will be less snowfall over the long-term average conditions and higher mean sea level elevations.

3.3.2.1 Continued Long-Term Operation of the CVP and SWP Facilities

The CVP and SWP operations would be in accordance with water rights permits and licenses issued by the SWRCB and BOs issued by the USFWS and NMFS in the early 2000s. The CVP and SWP operations would be coordinated through the COA. As described under the No Action Alternative, many facilities operations have been modified since 1986 in response to regulatory requirements that were not part of the original COA assumptions or requirements. In addition, water quality and flow standards have been revised by the SWRCB since 1986, such as SWRCB Decision 1641 adopted in 2000. Reclamation and DWR have operational arrangements to accommodate new facilities, water quality and flow objectives, the CVPIA, SWRCB criteria, and ESA, but the COA has not been formally modified to address these newer operating conditions.

The ongoing operational management policies of the CVP and SWP under the Second Basis of Comparison would be similar to the operational assumptions described in Appendix 3A, No Action Alternative: Central Valley Project and State Water Project Operations, except for the sections identified as “Implementation of the 2008 USFWS BO [and/or 2009 NMFS BO]” and New Melones Reservoir operations.

3.3.2.1.1 New Melones Reservoir Operations

Under Second Basis of Comparison, operations of New Melones Reservoir would be the same as under the No Action Alternative for flood management, water quality, San Joaquin River base flows and pulse flows at Vernalis, and water supply. Because the Second Basis of Comparison represents regulatory environment without the 2008 USFWS and 2009 NMFS BOs, fishery flows would be consistent with the 1997 New Melones Interim Plan of Operations (IPO) without implementation of the Vernalis Adaptive Management Program (VAMP), as described in Appendix 3A, No Action Alternative: Central Valley Project and State Water Project Operations.

3.3.2.2 Actions in the 2008 USFWS BO and 2009 NMFS BO that Would Have Occurred without Implementation of the Biological Opinions

Several actions included in the 2008 USFWS BO and 2009 NMFS BO address items that were underway in 2008 and 2009, respectively; or that have been completed. These actions currently are being implemented and would have been implemented with or without the BOs, including the following actions. The following actions included under the No Action Alternative also would be implemented under the Second Basis of Comparison.

- 2009 NMFS BO RPA Action I.1.3, Clear Creek Spawning Gravel Augmentation.
- 2009 NMFS BO RPA Action I.1.4, Spring Creek Temperature Control Curtain Replacement.
- 2009 NMFS BO RPA Action I.2.6, Restore Battle Creek for Winter-Run, Spring-Run, and Central Valley Steelhead.

- 2009 NMFS BO RPA Action I.3.1, Operate Red Bluff Diversion Dam with Gates Out.
- 2009 NMFS BO RPA Action I.5, Funding for CVPIA Anadromous Fish Screen Program.
- 2009 NMFS BO RPA Action I.6.1, Restoration of Floodplain Habitat; and Action I.6.2, Near-Term Actions at Liberty Island/Lower Cache Slough and Lower Yolo Bypass; Action I.6.3, Lower Putah Creek Enhancements; Action I.6.4, Improvements to Lisbon Weir; and Action I.7, Reduce Migratory Delays and Loss of Salmon, Steelhead, and Sturgeon at Fremont Weir and Other Structures in the Yolo Bypass.
- 2009 NMFS BO RPA Action II.1, Lower American River Flow Management.
- 2008 USFWS BO RPA Component 4, Habitat Restoration.

3.3.2.3 Future Actions not included in the 2008 USFWS BO and 2009 NMFS BO that Would Have Occurred without Implementation of the Biological Opinions

The Second Basis of Comparison also includes assumptions unrelated to implementation of the 2008 USFWS BO and 2009 NMFS BO, including: climate change and sea level rise; development of lands in accordance with general plans in areas served by CVP and SWP water supplies; and reasonable and foreseeable projects that have been approved and are anticipated to be implemented by 2030. These following items are included in the Second Basis of Comparison and are assumed to be identical to the assumptions under the No Action Alternative.

- Climate Change and Sea Level Rise
- General Plan Development in CVP and SWP Service Areas
- Continued Implementation of Ongoing Federal, State, and Local Water Resources Policies
- Continued Implementation of the CVPIA Provisions
- Reasonable and Foreseeable Projects and Programs (as described above in Section 3.3.1.4.4)
 - Trinity River Restoration Program
 - Clear Creek Mercury Abatement and Fisheries Restoration Project
 - Iron Mountain Mine Superfund Site
 - Mainstem Sacramento River and American River Gravel Augmentation Programs
 - Nimbus Fish Hatchery Fish Passage Project
 - FERC Relicensing for Middle Fork of the American River Project
 - Lower Mokelumne River Spawning Habitat Improvement Project
 - Dutch Slough Tidal Marsh Restoration

- Suisun Marsh Habitat Management, Preservation, and Restoration Plan Implementation
- Tidal Wetland Restoration in the Delta and Suisun Marsh
- San Joaquin River Restoration Program
- Stockton Deep Water Ship Channel Demonstration Dissolved Oxygen Project
- Grassland Bypass Project
- Municipal Water Supply Projects
- Water Transfer Projects

3.4 Development of Reasonable Alternatives

The CEQ National Environmental Policy Act (NEPA) regulations and DOI NEPA regulations (43 CFR Section 46.415(b)) require an EIS to include a range of reasonable alternatives that meet the purpose and need of the proposed action, and address one or more significant issues related to the proposed action.

The DOI NEPA regulations also state that the lead agencies should include a consensus-based alternatives consistent with the purpose and need of the proposed project that are proposed by participating persons, organizations, or communities who may be interested in or affected by the proposed project when one exists. No alternatives or alternative concepts submitted to Reclamation during preparation of this EIS were identified as a consensus-based alternative.

Identification of the range of alternatives was developed for this EIS through the development of screening criteria based upon the purpose of the action; comparison of alternative concepts identified by Reclamation, stakeholders, and agencies to the screening criteria; and review of the identified range of alternatives to determine if the range of alternatives addresses the significant issues.

3.4.1 Application of Screening Criteria to the Range of Alternative Concepts

The screening criteria developed for this EIS is based upon the purpose of the action, as described in Chapter 2, Purpose and Need for the Action. The purpose of the action is:

- To continue the operation of the CVP, in coordination with operation of the SWP, for the authorized purposes, in a manner that:
 - Is similar to historic operational parameters with certain modifications;
 - Is consistent with Federal Reclamation law; other Federal laws; Federal permits and licenses; State of California water rights, permits, and licenses; and

- Enables Reclamation and DWR to satisfy their contractual obligations to the fullest extent possible.

A number of alternative concepts were identified during the scoping process and through meetings with stakeholders and agencies during preparation of this EIS. These concepts were compared to the purpose of the action, as summarized in Table 3.1. Most of the concepts were incorporated into alternatives to be evaluated in detail in this EIS. Further discussion of concepts not included in the alternatives evaluated in detail in this EIS is presented in Section 3.4.8, Alternatives Considered but Not Evaluated in Detail.

Table 3.1 Application of Screening Criteria to Alternative Concepts Identified for Consideration in the EIS

| Alternative Concept | Consistent with Purpose for the Action | Addresses One or More Significant Issues | Include in One or More of the Alternatives Evaluated in the Draft EIS |
|--|---|---|--|
| Concept 1. CVP and SWP Operations without actions defined in the 2008 USWS BO RPA and 2009 NMFS BO RPA | Possibly | Yes | Yes, included in Alternatives 1, 3, and 4 |
| Concept 2. Modify actions defined in the 2008 USWS BO RPA and 2009 NMFS BO RPA in a manner that would increase CVP and SWP deliveries | Possibly | Yes | Yes, included in Alternatives 1, 3, and 4 |
| Concept 3. Modify actions defined in the 2008 USWS BO RPA and 2009 NMFS BO RPA in a manner that would reduce reverse flows and increase Delta outflow in the spring. | Possibly | Yes | Yes, included in Alternative 5 |
| Concept 4. Modify actions defined in the 2008 USWS BO RPA and 2009 NMFS BO RPA in a manner that would increase primary productivity and flood supply for aquatic resources | Possibly | Yes | Yes, included in Alternatives 1, 3, 4, and 5 |
| Concept 5. Modify actions defined in the 2008 USWS BO RPA and 2009 NMFS BO RPA in a manner that would modify the triggers for OMR criteria to protect Delta Smelt as follows: a) Reduce OMR criteria to a level between -5,000 cfs and + | Possibly | Yes | Yes, included in Alternative 3 |

| | | | |
|--|----------|-----|--|
| <p>3,500 cfs only when appropriate based on analysis of turbidity levels and normalized salvage data in the south Delta</p> <p>b) Reduce OMR to no more negative than -5,000 cfs when more than 25 percent of the Delta Smelt collected in the spring kodiak or 20 mm trawl are located in the south Delta or the adult cumulative salvage index immediately preceding spawning is high; lift this restriction if Qwest is >12,000 cfs and/or secchi depth in the south Delta is >85 cm</p> <p>Do not implement RPA actions in the 2008 USFWS BO or 2009 NMFS BO</p> | | | |
| <p>Concept 6. Modify actions defined in the 2009 NMFS BO RPA related to the Interim Criteria for the San Joaquin River Inflow:Export ratio as follows for April 1 through May 30:</p> <p>Flows in San Joaquin River at Vernalis (7-day running average shall not be less than 7 percent of the target requirement) shall be based on the New Melones Index (as described in 2009 NMFS BO RPA Action IV.2.1) as follows for January 1 through June 15:</p> <p>a) If the Index is 999 TAF or less - no minimum flow requirement</p> <p>b) If the Index is 1000-1399 TAF - minimum flow is the greater of the SWRCB D-1641 requirement or 1500 cfs</p> <p>c) If the Index is 1400-1999 TAF - minimum flow is the greater of the SWRCB D-1641 requirement or 3000 cfs</p> <p>d) If the Index is 2000-2499 TAF - minimum flow is 4500 cfs</p> <p>e) If the Index is above 2499</p> | Possibly | Yes | No, this criteria is not implementable following the completion of the Vernalis Adaptive Management Program. Other flow criteria for the San Joaquin River at Vernalis are included in the range of alternatives |

| | | | |
|---|-------|-----|---------------------------------------|
| TAF - minimum flow is 6000 cfs Do not implement RPA actions in the 2008 USFWS BO or 2009 NMFS BO | | | |
| Concept 7. Implement predator control programs for Black Bass, Striped Bass, and Pikeminnow to protect salmonids and Delta Smelt as follows: a) Black Bass catch limit changed to allow catch of 12-inch fish with a bag limit of 10 b) Striped Bass catch limit changed to allow catch of 12-inch fish with a bag limit of 5 c) Establish a Pikeminnow sport-fishing reward program with a 8-inch limit at \$2/fish | Yes | Yes | Yes, included in Alternatives 3 and 4 |
| Concept 8. Restore or create at least 10,000 acres of tidally influenced seasonal or perennial wetlands. Do not implement other wetlands restoration RPA actions in the 2008 USFWS BO or 2009 NMFS BO | Yes | Yes | Yes, included in Alternatives 3 and 4 |
| Concept 9. Establish a trap and haul program for juvenile salmonids entering the Delta from the San Joaquin River in March through June as follows: a) Begin operation of downstream migrant fish traps upstream of the Head of Old River on the San Joaquin River b) "Barge" all captured juvenile salmonids through the Delta, release at Chipps Island. c) Tag subset of fish in order to quantify effectiveness of the program d) Attempt to capture 10 percent to 20 percent of outmigrating juvenile salmonids | Yes | Yes | Yes, included in Alternatives 3 and 4 |
| Concept 10. Work with | Maybe | Yes | Yes, included in |

| | | | |
|---|----------|-----|--------------------------------|
| Pacific Fisheries Management Council, CDFW, and NMFS to minimize harvest mortality of natural origin Central Valley Chinook Salmon, including fall-run Chinook Salmon, by evaluating and modifying ocean harvest for consistency with Viable Salmonid Population Standards; including harvest management plan to show that abundance, productivity, and diversity (age-composition) are not appreciably reduced | | | Alternative 3 |
| Concept 11. Work with Pacific Fisheries Management Council, CDFW, and NMFS to impose salmon harvest restrictions to reduce by-catch of winter-run and spring-run Chinook Salmon to less than 10 percent of age-3 cohort in all years | Maybe | Yes | Yes, included in Alternative 4 |
| Concept 12. Limiting floodplain development to protect salmonids and Delta Smelt by implementing the following actions: a) Incorporate guidance into flood hazard mapping to help communities comply with the ESA b) Require communities to demonstrate ESA compliance for all flood plain map revisions c) Prioritize consideration of ESA listed species and critical habitat when selecting flood insurance studies d) Develop and implement floodplain management criteria e) Refine community rating system to provide credits for natural and beneficial functions f) Prohibit new development and substantial improvements to existing development within any designated floodway or within | Possibly | Yes | Yes, included in Alternative 4 |

| | | | |
|--|----------|-----|--|
| 170 feet of the ordinary high water line of any floodway | | | |
| Concept 13. Do not implement USACE requirements for vegetation on levees, and instead bar removal of vegetation from levees, require planting of trees and shrubs on levees, and armor levees with vegetation, woody material, and root re-enforcement material instead of riprap | Possibly | Yes | Yes, included in Alternative 4 |
| Concept 14. Advance the timing of upgrades at the Sacramento Regional Wastewater Treatment Plant to 2017; and implement advanced treatment technologies at the Fairfield-Suisun Sewer District treatment plant to reduce nutrients in the effluent | Yes | Yes | No, these actions are under construction and will be complete by 2030, per the requirements of the SWRCB and the related Regional Water Quality Control Boards |
| Concept 15. Expand the current period of time for water transfers addressed in the operations consulted on in the 2008 USFWS BO and 2009 NMFS BO from July through September to year-round | Possibly | Yes | Yes, included in Alternative 4 |
| Concept 16. Include measures to support Federal and state fish-doubling goals, including the goals of CVPIA | Yes | Yes | Yes, included in Alternatives 1, 2, 3, 4, and 5 as part of ongoing implementation of CVPIA |
| Concept 17. Operate the CVP and SWP to avoid "dead-pool" conditions in Shasta Lake, Folsom Lake, and Lake Oroville | Possibly | Yes | Yes, included in Alternatives 1, 2, 3, 4, and 5 as part of overall CVP and SWP operations |
| Concept 18. Change CVP water operations to meet all in-basin water demands for the Trinity, Sacramento, American, and Stanislaus rivers watersheds before meeting other CVP water demands | No | Yes | No, this concept would not be consistent with the purpose for the action |
| Concept 19. Implement operations of the New Melones Reservoir in accordance with the 2012 | Possibly | Yes | Yes, included in Alternative 3 |

| | | | |
|---|----------|-------|--|
| Oakdale Irrigation District and South San Joaquin Irrigation District Operations Plan | | | |
| Concept 20. Reduce reliance of the CVP and SWP water users on water exported from the Delta through development of regional and local water supplies | Possibly | Yes | Yes, included in Alternatives 1, 2, 3, 4, and 5 as part of overall statewide water operations |
| Concept 21. Changes to methods used to monitor and predict OMR flow criteria, including exclusion of Contra Costa Water District diversions from the calculations | Possibly | Maybe | No, this EIS analyzes overall operational concepts for the CVP and SWP. Specific methods to monitor and predict operations will be developed under separate efforts by Reclamation |
| Concept 22. Prioritize use of CVPIA restoration funds within watersheds in accordance with the amount of restoration funds collected in each watershed (e.g., the most funds would be highest in the watershed that generates the highest CVPIA restoration fund based upon water sales) | No | No | No, would not be consistent with CVPIA |
| Concept 23. Completely cease operations of the CVP and SWP facilities | No | No | No, this concept would not be consistent with the purpose for the action |

Concepts identified as “possibly consistent with the purpose of the action” would require development of additional details and evaluation to determine if the concept is consistent with the stated purpose for the action, as described in Chapter 2, Purpose and Need for the Action. Concepts identified as “possibly consistent with the purpose of the action” were integrated into one or more of the alternatives evaluated in this EIS.

Based upon the comparison of screening criteria to the alternative concepts developed by Reclamation 17 of the 23 alternative concepts would be included in one or more of the alternatives evaluated in this EIS. The next step in the development of the alternatives is to combine the alternative concepts into specific alternatives and determine if the range of alternatives is adequate to address the significant issues in implementing a program that supports the purpose of the action.

3.4.2 Identification of Alternatives

The 17 alternative concepts were compiled into five alternatives. Development of the alternatives was informed by comments received about the alternative

concepts. For example, numerous comments were received to evaluate an alternative that included assumptions identical to the Second Basis of Comparison assumptions in which the 2008 USFWS BO and 2009 NMFS BO would not be implemented. One of the scoping comments identified specific alternatives that included several alternative concepts included in Table 3.1; however, some of the specified alternative concepts were not consistent with assumptions for the Year 2030 and were modified to reflect implementable concepts.

Several of the alternative concepts are consistent with the No Action Alternative assumptions related to actions that would have occurred with or without implementation of the 2008 USFWS BO and 2009 NMFS BO. Therefore, the following alternative concepts are included under the No Action Alternative, Second Basis of Comparison, and all other alternatives.

- Alternative Concept 8 to restore or create at least 10,000 acres of tidally-influenced seasonal or perennial wetlands.
- Alternative Concept 16 to support the fish-doubling goals under CVPIA and state ecosystem restoration programs.
- Alternative Concept 17 to operate the CVP and SWP to avoid dead-pool conditions in the CVP and SWP reservoirs, to the extent possible based upon hydrologic conditions.
- Alternative Concept 20 to increase regional and local water supplies that could be used when CVP and SWP water supplies are reduced due to hydrologic and regulatory restrictions.

Using these concepts, the alternative concepts were combined into Alternatives 1 through 5 in a manner to avoid conflicts between concepts within an alternative. The descriptions of Alternatives 1 through 5 are presented below.

3.4.3 Alternative 1

Alternative 1 was created because many comments requested an alternative that reflected conditions without implementation of the 2008 USFWS BO and the 2009 NMFS BO. Since the Second Basis of Comparison is not a true alternative, in accordance with NEPA guidelines, Reclamation could not select Second Basis of Comparison as a preferred alternative. Therefore, Alternative 1 was defined as being identical to the Second Basis of Comparison, as defined in Section 3.3.2.

3.4.4 Alternative 2

Alternative 2 was first included in the Notice of Intent and identified as a “preliminary proposed action” that included the operational actions of the 2008 USFWS BO and 2009 NMFS BO. Alternative 2 does not include RPA actions that would require future studies and environmental documentation to define recommended actions (generally, structural actions).

The definition of Alternative 2 is based upon the following assumptions that are briefly described below.

- Continued long-term operation of the CVP and SWP in accordance with ongoing management policies, criteria, and regulations, including water right permits and licenses issued by the SWRCB and implementation of the 2008 USFWS BO and 2009 NMFS BO, as described under the No Action Alternative.
- Implementation of existing and future actions described in the 2008 USFWS BO and 2009 NMFS BO that would occur by 2030 without implementation of the BOs, as described above for the No Action Alternative in Sections 3.4.1.2 and 3.4.1.3.
- Implementation of future actions not described in the 2009 NMFS BO that would occur by 2030 without implementation of any alternatives considered in this EIS.

Alternative 2 conditions assume that climate change conditions would have changed between 2015 and 2030. It is anticipated that by 2030, there will be less snowfall over the long-term average conditions and higher mean sea level elevations.

Alternative 2 would not include actions in the 2008 USFWS BO and 2009 NMFS BO that have not been fully defined at this time; and therefore, would require future engineering and environmental evaluation prior to implementation. These following actions are not included in Alternative 2.

- 2009 NMFS BO RPA Action I.2.5, Winter-Run Passage and Re-Introduction Program at Shasta Dam.
- 2009 NMFS BO RPA Action II.3, Structural Improvements for Temperature Management on the American River.
- 2009 NMFS BO RPA Action II.5, Fish Passage at Nimbus and Folsom Dams.
- 2009 NMFS BO RPA Action II.6, Implement Actions to Reduce Genetic Effects of Nimbus and Trinity River Fish Hatchery Operations.
- 2009 NMFS BO RPA Action III.2.1, Increase and Improve Quality of Spawning Habitat with Addition of Gravel.
- 2009 NMFS BO RPA Action III.2.2, Conduct Floodplain Restoration and Inundation Flows in Winter or Spring to Inundate Steelhead Juvenile Rearing Habitat on Stanislaus River.
- 2009 NMFS BO RPA Action III.2.3, Restore Freshwater Migratory Habitat for Juvenile Steelhead on Stanislaus River.
- 2009 NMFS BO RPA Action III.2.4, Fish Passage at New Melones, Tulloch, and Goodwin Dams.
- 2009 NMFS BO RPA Action IV.4, Tracy Fish Collection Facility Improvements to Reduce Pre-Screen Loss and Improve Screening Efficiency.
- 2009 NMFS BO RPA Action IV.4.2 Skinner Fish Collection Facility

Improvements to Reduce Pre-Screen Loss and Improve Screening Efficiency.

- 2009 NMFS BO RPA Action IV.4.3 Tracy Fish Collection Facility and the Skinner Fish Collection Facility Actions to Improve Salvage Monitoring, Reporting and Release Survival Rates.

3.4.4.1 Continued Long-Term Operation of the CVP and SWP Facilities

The CVP and SWP operations and ongoing operational management policies of the CVP and SWP under Alternative 2 would be identical to the operational assumptions described in Appendix 3A, No Action Alternative: Central Valley Project and State Water Project Operations.

3.4.4.2 Actions in the 2008 USFWS BO and 2009 NMFS BO that Would Have Occurred without Implementation of the Biological Opinions

Actions included in the 2008 USFWS BO and 2009 NMFS BO that would have occurred with or without the BOs, would be identical under Alternative 2 as under the No Action Alternative and the Second Basis of Comparison.

3.4.4.3 Future Actions not included in the 2008 USFWS BO and 2009 NMFS BO that Would Have Occurred without Implementation of the Biological Opinions

Alternative 2 also includes assumptions unrelated to implementation of the 2008 USFWS BO and 2009 NMFS BO, including: climate change and sea level rise; development of lands in accordance with general plans in areas served by CVP and SWP water supplies; and reasonable and foreseeable projects that have been approved and are anticipated to be implemented by 2030. These items included in Alternative 2 are identical as under the No Action Alternative and the Second Basis of Comparison.

3.4.5 Alternative 3

Alternative 3 was developed based upon a scoping comment from the Coalition for a Sustainable Delta which identified “RPA Alternative 1,” and a scoping comment received from Oakdale Irrigation District (OID) and South San Joaquin Irrigation District (SSJID) (included in the Scoping Report in Appendix 23A of this EIS). The definition of Alternative 3 is based upon the following assumptions that are briefly described below.

- Continued long-term operation of the CVP and SWP in accordance with ongoing management policies, criteria, and regulations, including water right permits and licenses issued by the SWRCB; without the operational requirements of the 2008 USFWS BO and the 2009 NMFS BO; plus implementation of the 2012 operations plan for New Melones Reservoir proposed by OID and SSJID.
- Implementation of actions described in the Coalition for a Sustainable Delta scoping comment letter related to “RPA Alternative 1.”
- Implementation of existing and future actions described in the 2008 USFWS BO and 2009 NMFS BO that would occur by 2030 without implementation of

the BOs, as described above for the No Action Alternative in Sections 3.4.1.2 and 3.4.1.3.

- Implementation of future actions not described in the 2009 NMFS BO that would occur by 2030 without implementation of any alternatives considered in this EIS.

Alternative 3 would not include implementation of actions described in the 2008 USFWS BO and 2009 NMFS BO that would not occur by 2030 without implementation of the BOs.

Alternative 3 conditions assume that climate change conditions would have changed between 2015 and 2030. It is anticipated that by 2030, there will be less snowfall over the long-term average conditions and higher mean sea level elevations.

3.4.5.1 Continued Long-Term Operation of the CVP and SWP Facilities

The CVP and SWP operations and ongoing operational management policies of the CVP and SWP under Alternative 3 would be similar to the operational assumptions under the Second Basis of Comparison with the following changes to water demand assumptions, OMR criteria, and operations of New Melones Reservoir to meet SWRCB D-1641 flow requirements on the San Joaquin River at Vernalis.

Alternative 3 would include additional demands for American River water supplies as compared to the No Action Alternative or Second Basis of Comparison. The additional demands would provide water supplies of up to 17 TAF/year under a Warren Act Contract for El Dorado Irrigation District and 15 TAF/year under a Warren Act Contract for El Dorado County Water Agency.

3.4.5.1.1 Old and Middle River Criteria

The OMR flow criteria under Alternative 3 are based on concepts addressed in the 2008 USFWS BO and 2009 NMFS BO related to adaptive restrictions for temperature, turbidity, salinity, and presence of Delta Smelt. The OMR flow criteria in the Alternative 3 are similar to those of the No Action Alternative, as described in Appendix 3A, No Action Alternative: Central Valley Project and State Water Project Operations, with the exception of the following changes:

- Action 1 that protects the pre-spawning adult Delta Smelt from entrainment is modified to limit exports such that the average daily OMR flow is no more negative than -3,500 cfs for a total duration of 14 days, with a 5-day running average no more negative than -4,375 cfs (within 25 percent of the monthly criteria).
- Action 2 that protects adult Delta Smelt within the Delta from entrainment is modified to limit exports so that the average daily OMR flow is no more negative than -3,500 or -7,500 cfs depending on the previous month's ending X2 location (-3,500 cfs if X2 is east of Roe Island, or -7,500 cfs if X2 is west of Roe Island), with a 5-day running average within 25 percent of the monthly

criteria (no more negative than -4,375 cfs if X2 is east of Roe Island, or -9,375 cfs if X2 is west of Roe Island).

- Action 3 that protects larval and juvenile Delta Smelt from entrainment is modified to limit exports so that the average daily OMR flow is no more negative than -1,250, -3,500, or -7,500 cfs, depending on the previous month's ending X2 location (-1,250 cfs if X2 is east of Chipps Island, -7,500 cfs if X2 is west of Roe Island, or -3,500 cfs if X2 is between Chipps and Roe Island, inclusively), with a 5-day running average within 25 percent of the monthly criteria (no more negative than -1,562 cfs if X2 is east of Chipps Island, -9,375 cfs if X2 is west of Roe Island, or -4,375 cfs if X2 is between Chipps and Roe Island).
- Temporal off-ramp for Action 3 is assumed to occur no later than June 15 (changed from June 30).
- An off-ramp based on QWest (westerly flow on the San Joaquin River past Jersey Point calculated as a combination of San Joaquin River at Blind Point, Three Mile Slough and Dutch Slough) is assumed. If Qwest is greater than 12,000 cfs, then the Action 3 is discontinued. Because Action 2 is defined to occur between Actions 1 and 3, the Qwest off-ramp also results in discontinuation of Action 2 if it happens before Action 3 is triggered. In monthly CalSim II modeling, previous month's QWest value is used for determining the off-ramp, therefore if the off-ramp occurs within the previous month, actions in that previous month are assumed to continue until the end of the month.

3.4.5.1.2 New Melones Operations Criteria

Alternative 3 assumes that the flood control operations for the New Melones Reservoir would be the same as under the No Action Alternative. However, New Melones Reservoir would be operated for different fishery flows, water quality flows, and San Joaquin River base flows and pulse flows at Vernalis.

Fishery

In the Alternative 3 simulation, fishery flows are modeled per the OID and SSJID 2012 operations proposal, as summarized in Tables 3.2 through 3.4. These flows include an outmigration pulse flow from April 1 through May 15. Total annual volume dedicated to fishery flows vary from 174 to 318 TAF depending on the hydrologic conditions defined by the New Melones water supply forecast (the end-of-February New Melones Storage, plus the March - September forecast of inflow to the reservoir).

Table 3.2 Annual Fishery Flow Allocation in New Melones

| Melones Water Supply Forecast (TAF) | Fishery Base Flows (TAF) |
|-------------------------------------|--------------------------|
| 0 to 1,800 | 174 |
| 1,801 to 2,500 | 235 |
| >2,500 | 318 |

Table 3.3 Monthly “Base” Flows for Fisheries Purposes Based on the Annual Fishery Volume

| Annual Fishery Flow Volume (TAF) | Monthly Fishery Base Flows (cfs) | | | | | | | | | | | |
|----------------------------------|----------------------------------|-----|-----|-----|-----|-----|-------|-----|-----|-----|-----|-----|
| | Oct | Nov | Dec | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep |
| 235 | 252 | 300 | 300 | 150 | 173 | 200 | 200 | 200 | 200 | 200 | 200 | 200 |
| 318 | 300 | 300 | 300 | 300 | 300 | 300 | 1,500 | 850 | 200 | 200 | 200 | 200 |

Table 3.4 April 1 through May 31 “Pulse” Flows for Fisheries Purposes Based on the Annual Fishery Volume

| Melones Water Supply Forecast (TAF) | Fishery Pulse Flows (CFS) April 1 –May 31 |
|-------------------------------------|---|
| 0 to 1,800 | 750 |
| 1,801 to 2,500 | 1,500 |
| >2,500 | 1,500 |

Water Quality

Alternative 3 assumes that no water is released from New Melones Reservoir to meet the SWRCB D-1641 water quality criteria in the San Joaquin River. Water is released to meet the SWRCB D-1422 DO criteria; however, the compliance point is moved from Ripon to the Orange Blossom Bridge under the Alternative 3.

Bay-Delta Flows

Alternative 3 assumes that no water is released from New Melones Reservoir to meet the SWRCB D-1641 Bay-Delta flow requirements on the San Joaquin River at Vernalis for base flows or pulse flows.

3.4.5.2 Actions Related to Predation Control, Wetlands Restoration, Juvenile Salmonid Trap and Haul Program, and Chinook Salmon Ocean Harvest

Alternative 3 includes the following actions as described in “RPA Alternative 1” in the Coalition for a Sustainable Delta scoping comment.

- Implement predator control programs for Black Bass, Striped Bass, and Pikeminnow to protect salmonids and Delta Smelt as follows:
 - Black Bass catch limit changed to allow catch of 12-inch fish with a bag limit of 10
 - Striped Bass catch limit changed to allow catch of 12-inch fish with a bag limit of 5

- Establish a Pikeminnow sport-fishing reward program with a 8-inch limit at \$2/fish
- Restore or create at least 10,000 acres of tidally influenced seasonal or perennial wetlands. These conditions are the same as under the No Action Alternative and Second Basis of Comparison.
- Establish a trap and haul program for juvenile salmonids entering the Delta from the San Joaquin River in March through June as follows:
 - Begin operation of downstream migrant fish traps upstream of the Head of Old River on the San Joaquin River
 - “Barge” all captured juvenile salmonids through the Delta, release at Chipps Island.
 - Tag subset of fish in order to quantify effectiveness of the program
 - Attempt to capture 10 percent to 20 percent of out-migrating juvenile salmonids
- Work with Pacific Fisheries Management Council, CDFW, and NMFS to minimize harvest mortality of natural origin Central Valley Chinook Salmon, including fall-run Chinook Salmon, by evaluating and modifying ocean harvest for consistency with Viable Salmonid Population Standards; including harvest management plan to show that abundance, productivity, and diversity (age-composition) are not appreciably reduced.

3.4.5.3 Actions in the 2008 USFWS BO and 2009 NMFS BO that Would Have Occurred without Implementation of the Biological Opinions

Actions included in the 2008 USFWS BO and 2009 NMFS BO that would have occurred with or without the BOs, would be identical under Alternative 3 as under the No Action Alternative and the Second Basis of Comparison.

3.4.5.4 Future Actions not included in the 2008 USFWS BO and 2009 NMFS BO that Would Have Occurred without Implementation of the Biological Opinions

Alternative 3 also includes assumptions unrelated to implementation of the 2008 USFWS BO and 2009 NMFS BO, including: climate change and sea level rise; development of lands in accordance with general plans in areas served by CVP and SWP water supplies; and reasonable and foreseeable projects that have been approved and are anticipated to be implemented by 2030. These items included in Alternative 3 are identical as under the No Action Alternative and the Second Basis of Comparison.

3.4.6 Alternative 4

Alternative 4 was developed based upon a scoping comment from the Coalition for a Sustainable Delta which identified “RPA Alternative 2” (included in the Scoping Report in Appendix 23A of this EIS). The definition of Alternative 4 is based upon the following assumptions that are briefly described below.

- Continued long-term operation of the CVP and SWP in accordance with ongoing management policies, criteria, and regulations, including water right permits and licenses issued by the SWRCB; without the operational requirements of the 2008 USFWS BO and the 2009 NMFS BO, as described under Second Basis of Comparison.
- Implementation of actions described in the Coalition for a Sustainable Delta scoping comment letter related to “RPA Alternative 2.”
- Implementation of existing and future actions described in the 2008 USFWS BO and 2009 NMFS BO that would occur by 2030 without implementation of the BOs, as described above for the No Action Alternative in Sections 3.4.1.2 and 3.4.1.3.
- Implementation of future actions not described in the 2009 NMFS BO that would occur by 2030 without implementation of any alternatives considered in this EIS.

Alternative 4 would not include implementation of actions described in the 2008 USFWS BO and 2009 NMFS BO that would not occur by 2030 without implementation of the BOs.

The “RPA Alternative 2” also included a provision to “Advance the timing of upgrades at the Sacramento Regional Wastewater Treatment Plant to 2017; and implement advanced treatment technologies at the Fairfield-Suisun Sewer District treatment plant to reduce nutrients in the effluent.” However, both of these actions would be complete by 2030, the study period considered in this EIS. The Sacramento Regional Wastewater Treatment Plant must comply with the National Pollutant Discharge Elimination System permit issued on December 9, 2010 by the Central Valley Regional Water Quality Control Board to reduce nutrients in the effluent discharged to the Sacramento River by 2020 (SRCSD 2012). The Fairfield Suisun Sewer District must comply with similar permit conditions issued by the San Francisco Bay Regional Water Quality Control Board in March 2015 (SFRRWQCB 2015). Because the Environmental Consequences analysis in this EIS is conducted as a “snapshot” in time at 2030, inclusion of a provision to require compliance with the discharge requirements prior to 2020 could not be evaluated.

Alternative 4 conditions assume that climate change conditions would have changed between 2015 and 2030. It is anticipated that by 2030, there will be less snowfall over the long-term average conditions and higher mean sea level elevations.

3.4.6.1 Continued Long-Term Operation of the CVP and SWP Facilities

The ongoing operational management policies of the CVP and SWP under Alternative 4 would be identical to operations described under the Second Basis of Comparison.

3.4.6.2 Actions Related to Floodplain Protection, Levee Vegetation, Predation Control, Wetlands Restoration, Juvenile Salmonid Trap and Haul Program, and Chinook Salmon Ocean Harvest

Alternative 3 includes the following actions as described in “RPA Alternative 1” in the Coalition for a Sustainable Delta scoping comment.

- Limiting floodplain development to protect salmonids and Delta Smelt by implementing the following actions:
 - Incorporate guidance into flood hazard mapping to help communities comply with the ESA
 - Require communities to demonstrate ESA compliance for all flood plain map revisions
 - Prioritize consideration of ESA listed species and critical habitat when selecting flood insurance studies
 - Develop and implement floodplain management criteria
 - Refine community rating system to provide credits for natural and beneficial functions
 - Prohibit new development and substantial improvements to existing development within any designated floodway or within 170 feet of the ordinary high water line of any floodway
- Modify the requirements of the USACE related to removal of vegetation on levees. USACE requires removal of vegetation on levees. DWR and USACE have been working to develop a plan that would allow for the continuation of existing vegetation on levees until levee maintenance or repairs requires removal of the vegetation. Under Alternative 4, trees and shrubs would be planted along the levees; and vegetation, woody material, and root re-enforcement material would be installed on the levees instead of riprap for erosion protection.
- Implement predator control programs for Black Bass, Striped Bass, and Pikeminnow to protect salmonids and Delta Smelt as follows:
 - Black Bass catch limit changed to allow catch of 12-inch fish with a bag limit of 10
 - Striped Bass catch limit changed to allow catch of 12-inch fish with a bag limit of 5
 - Establish a Pikeminnow sport-fishing reward program with a 8-inch limit at \$2/fish
- Restore or create at least 10,000 acres of tidally influenced seasonal or perennial wetlands. These conditions are the same as under the No Action Alternative and Second Basis of Comparison.
- Establish a trap and haul program for juvenile salmonids entering the Delta from the San Joaquin River in March through June as follows:

- Begin operation of downstream migrant fish traps upstream of the Head of Old River on the San Joaquin River
- “Barge” all captured juvenile salmonids through the Delta, release at Chipps Island.
- Tag subset of fish in order to quantify effectiveness of the program
- Attempt to capture 10 percent to 20 percent of outmigrating juvenile salmonids
- Work with Pacific Fisheries Management Council, CDFW, and NMFS to impose salmon harvest restrictions to reduce by-catch of winter-run and spring-run Chinook Salmon to less than 10 percent of age-3 cohort in all years

3.4.6.3 Actions in the 2008 USFWS BO and 2009 NMFS BO that Would Have Occurred without Implementation of the Biological Opinions

Actions included in the 2008 USFWS BO and 2009 NMFS BO that would have occurred with or without the BOs, would be identical under Alternative 4 as under the No Action Alternative and the Second Basis of Comparison.

3.4.6.4 Future Actions not included in the 2008 USFWS BO and 2009 NMFS BO that Would Have Occurred without Implementation of the Biological Opinions

Alternative 4 also includes assumptions unrelated to implementation of the 2008 USFWS BO and 2009 NMFS BO, including: climate change and sea level rise; development of lands in accordance with general plans in areas served by CVP and SWP water supplies; and reasonable and foreseeable projects that have been approved and are anticipated to be implemented by 2030. These items included in Alternative 4 are identical as under the No Action Alternative and the Second Basis of Comparison.

3.4.7 Alternative 5

Alternative 5 is similar to the No Action Alternative with reduced potential for reverse flows in April and May and with associated increased Delta outflow; and use of the SWRCB D-1641 pulse flow at Vernalis. Alternative 5 was developed considering comments from environmental interest groups during the scoping process. Alternative 5 also provides another method to operate the New Melones Reservoir as compared to the other alternatives.

The definition of Alternative 5 is based upon the following assumptions that are briefly described below.

- Continued long-term operation of the CVP and SWP in accordance with ongoing management policies, criteria, and regulations, including water right permits and licenses issued by the SWRCB; without the operational requirements of the 2008 USFWS BO and the 2009 NMFS BO.
- Implementation of existing and future actions described in the 2008 USFWS BO and 2009 NMFS BO that would occur by 2030 without implementation of

the BOs, as described above for the No Action Alternative in Sections 3.4.1.2 and 3.4.1.3.

- Implementation of actions described in the 2008 USFWS BO and 2009 NMFS BO that would not occur by 2030 without implementation of the BOs.
- Implementation of future actions not described in the 2009 NMFS BO that would occur by 2030 without implementation of any alternatives considered in this EIS.

Alternative 5 conditions assume that climate change conditions would have changed between 2015 and 2030. It is anticipated that by 2030, there will be less snowfall over the long-term average conditions and higher mean sea level elevations.

3.4.7.1 Continued Long-Term Operation of the CVP and SWP Facilities

The CVP and SWP operations and ongoing operational management policies of the CVP and SWP under Alternative 5 would be similar to the operational assumptions under the No Action Alternative with the following changes to water demand assumptions, OMR criteria, and operations of New Melones Reservoir to meet SWRCB D-1641 flow requirements on the San Joaquin River at Vernalis.

3.4.7.1.1 Water Demands

Alternative 5 would include additional water demands for users of water from the American River watershed as compared to the No Action Alternative or Second Basis of Comparison. Under Alternative 5, up to 17 TAF/year would be provided to the El Dorado Irrigation District under a Warren Act Contract to allow water to be conveyed through Folsom Lake; and up to 15 TAF/year would be provided to El Dorado County Water Agency under a separate Warren Act contract.

3.4.7.1.2 Old and Middle River Criteria

The OMR flow criteria under Alternative 5 is similar to the assumptions under the No Action Alternative and based on concepts addressed in the 2008 USFWS BO and 2009 NMFS BO plus a requirement for positive OMR (no reverse flows) in April and May of all water year types.

3.4.7.1.3 New Melones Operations Criteria

Alternative 5 assumptions for New Melones Reservoir operations are similar to assumptions under the No Action Alternative except for SWRCB D-1641 requirements for the San Joaquin River pulse flows at Vernalis, as summarized in Table 3.5.

Table 3.5 Bay-Delta Vernalis Flow Objectives (average monthly cfs)

| 60-20-20 Index | Pulse Flow Required if X2 is West of Chipps Island | Pulse Flow required if X2 is East of Chipps Island |
|-----------------------|---|---|
| Wet | 8,620 | 7,330 |
| Above Normal | 7,020 | 5,730 |

| | | |
|--------------|-------|-------|
| Below Normal | 5,480 | 4,620 |
| Dry | 4,880 | 4,020 |
| Critical | 3,540 | 3,110 |

3.4.7.2 Actions in the 2008 USFWS BO and 2009 NMFS BO that Would Have Occurred without Implementation of the Biological Opinions

Actions included in the 2008 USFWS BO and 2009 NMFS BO that would have occurred with or without the BOs, would be identical under Alternative 5 as under the No Action Alternative and the Second Basis of Comparison.

3.4.7.3 Actions in the 2009 NMFS BO that Would Not Have Occurred without Implementation of the Biological Opinions

Actions included in the 2008 USFWS BO and 2009 NMFS BO that would not have occurred without the BOs, would be identical under Alternative 5 as under the No Action Alternative.

3.4.7.4 Future Actions not included in the 2008 USFWS BO and 2009 NMFS BO that Would Have Occurred without Implementation of the Biological Opinions

Alternative 5 also includes assumptions unrelated to implementation of the 2008 USFWS BO and 2009 NMFS BO, including: climate change and sea level rise; development of lands in accordance with general plans in areas served by CVP and SWP water supplies; and reasonable and foreseeable projects that have been approved and are anticipated to be implemented by 2030. These items included in Alternative 5 are identical as under the No Action Alternative and the Second Basis of Comparison.

3.4.8 Alternatives Considered but Not Evaluated in Detail

As described above, 6 of the 23 alternative concepts identified for inclusion in the alternatives to be evaluated in this EIS were eliminated for further evaluation for several reasons, as described below.

3.4.8.1 Alternative Concept 6: Modify Flows in San Joaquin River at Vernalis

The 2009 NMFS BO included two phases related to implementation of the San Joaquin River Inflow to Export Ratio. The first phase, to be implemented in 2010 and 2011, assumed CVP and SWP operations under the Vernalis Adaptive Management Plan (VAMP) which provided for Reclamation to purchase water from non-CVP water users in the San Joaquin River watershed. The second phase was designed to be implemented following the completion of VAMP when Reclamation could no longer purchase water to meet flow requirements of the SWRCB D-1641 in the Delta.

Alternative Concept 6 recommended an operations that CVP could not meet without VAMP authorizations. Therefore, Alternative Concept 6 did not meet the provision in the purpose of the action to be “consistent with Federal Reclamation law; other Federal laws; Federal permits and licenses; State of California water

rights, permits, and licenses.” Alternative Concept 6 was not retained for analysis in the EIS.

3.4.8.2 Alternative Concept 14: Advance the Timing of Upgrades at Wastewater Treatment Plants

Alternative Concept 14 would advance the timing of upgrades at the Sacramento Regional Wastewater Treatment Plant to 2017; and implement advanced treatment technologies at the Fairfield-Suisun Sewer District treatment plant to reduce nutrients in the effluent.” However, both of these actions would be complete by 2030, the study period considered in this EIS. The Sacramento Regional Wastewater Treatment Plant must comply with the National Pollutant Discharge Elimination System permit issued on December 9, 2010 by the Central Valley Regional Water Quality Control Board to reduce nutrients in the effluent discharged to the Sacramento River by 2020 (SRCSD 2012). The Fairfield Suisun Sewer District must comply with similar permit conditions issued by the San Francisco Bay Regional Water Quality Control Board in March 2015 (SFRRWQCB 2015).

Because the Environmental Consequences analysis in this EIS is conducted as a “snapshot” in time at 2030, inclusion of a provision to require compliance with the discharge requirements prior to 2020 would not be evaluated. Therefore, Alternative Concept 14 was not retained for analysis in the EIS.

3.4.8.3 Alternative Concept 18: Change to CVP Operations to Meet In-Basin Water Demands prior to Meeting other CVP Water Demands

Alternative Concept 18 would require operations of the CVP to meet in-basin water demands in the Trinity, Sacramento, American, and Stanislaus rivers watersheds prior to use of the CVP water in other portions of the service area. However, the CVP is operated as integrated system to satisfy statutory, regulatory, and contractual obligations to the fullest extent possible, in accordance with the purpose of the action. Therefore, Alternative Concept 18 was not retained for analysis in the EIS.

3.4.8.4 Alternative Concept 21: Change methods used to monitor and predict OMR criteria

Alternative Concept 21 addresses an item that is related to methods to implement OMR monitoring and projections. The alternatives considered in this EIS address approaches to continued operation of the CVP and SWP. Methods to monitor and predict criteria used in CVP and SWP operations are considered by Reclamation as part of the operations of the CVP. Changes in methods used to monitor and predict OMR values can be applied to any of the alternatives considered in this EIS; and would not result in differentiations between alternatives. Therefore, Alternative Concept 21 was not retained for analysis in the EIS.

3.4.8.5 Alternative 22: Prioritize Use of CVPIA Restoration Funds in the Watersheds that Generated the Funds

As described above, the locations of CVPIA restoration activities are determined

based upon scientific framework throughout the CVP service area that connects restoration actions to environmental and population responses across watersheds (Reclamation 2013c). A system-wide science-based approach with performance indices, monitoring, and scientific review of results is used to provide direction as the CVPIA adapts to changing conditions. Changing the approach from the current CVPIA implementation plan could be considered to be inconsistent with Federal law. Therefore, Alternative Concept 22 was not retained for analysis in the EIS.

3.4.8.6 Alternative 23: Completely Cease Operations of the CVP and SWP

Complete cessation of CVP and SWP operations would not be consistent with the requirement of the purpose of the action to operate the CVP and SWP in a manner that is similar to historic operational parameters with certain modifications; and it would not be consistent with Federal Reclamation law; other Federal laws; Federal permits and licenses; State of California water rights, permits, and licenses related to delivery of water by CVP and SWP to water rights holder and related to flood management operations at the CVP and SWP reservoirs. Therefore, Alternative Concept 23 was not retained for analysis in the EIS.

3.5 Assumptions for Cumulative Effects Analysis

The CEQ regulations define cumulative effects as the impact on environmental, human, and community resources that results from the incremental impact of the proposed project when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or persons undertakes such actions. Cumulative effects can result from individually minor but collectively significant actions taking place over time (40 CFR 1508.7, 1508.25.) Future cumulative impacts should not be speculative but should be based upon known or reasonably foreseeable long-range plans, regulations, operating agreements, or other information that establishes them as reasonably foreseeable.

The reasonably foreseeable future actions included in the cumulative effects analysis are summarized below. The projects and actions are organized into:

- Water Supply and Water Quality Projects and Actions potentially affected by long-term operation of the SWP and CVP (organized geographically from north to south)
- Ecosystem Improvement Projects and Actions potentially affected by long-term operation of the SWP and CVP or potentially affecting resources analyzed in this EIS (organized geographically from north to south)

3.5.1 Water Supply and Water Quality Projects and Actions

There are numerous water supply and water quality projects and actions that could be potentially affected by changes in the coordinated long-term operation of the CVP and SWP, or could affect the CVP and SWP operations. Major future

water supply and water quality projects and actions are discussed below.

3.5.1.1 Bay-Delta Water Quality Control Plan Update

In accordance with the federal Clean Water Act and the Porter-Cologne Water Quality Control Act, basin plans must be developed for each hydrologic area. Each basin plan must contain water quality objectives to ensure the reasonable protection of beneficial uses, as well as a program of implementation for achieving those objectives. Federal regulations require each state to adopt water quality standards to protect the public health or welfare, enhance the quality of water, and serve the purposes of the Clean Water Act. In California, the beneficial uses and water quality objectives form the basis of the water quality control standards. In the Sacramento-San Joaquin Bay Delta, water quality and flow objectives to meet water quality criteria are included in the Water Quality Control Plan for the San Francisco Bay/Sacramento-San Joaquin Delta Estuary (Bay-Delta WQCP) (SWRCB 2006). The SWRCB and the Central Valley and San Francisco Regional Water Quality Control Boards are in the process of updating the Bay-Delta WQCP. The updates, or amendments, are being prepared in two phases. Initially, the SWRCB and Regional Water Quality Control Boards are evaluating new flow objectives for the Lower San Joaquin River and the tributaries of Stanislaus, Tuolumne, and Merced rivers; and southern Delta salinity objectives. The second phase is evaluating changes to other portions of the Bay-Delta WQCP including Delta outflows, SWP and CVP export restrictions, and other requirements in the Bay-Delta to protect fish and wildlife beneficial uses. A third phase will consider and assign responsibility for implementing measures to achieve the water quality objectives established in the first two phases (SWRCB 2012).

Ongoing programs to adopt and implement total maximum daily loads are described in Chapter 6, Surface Water Quality.

3.5.1.2 Bay Delta Conservation Plan and the California Water Fix

The Bay Delta Conservation Plan, BDCP and the ongoing California Water Fix are being developed by federal and state agencies and other stakeholders to achieve the dual goals of a reliable water supply for California and a healthy California Bay Delta ecosystem that supports the State's economy. The program would construct a new conveyance facility and modify operation of existing CVP and SWP Delta facilities; and reduce ecological stressors that impair the function or the use of the Delta by aquatic and terrestrial resources.

The Recirculated Draft EIR/Supplemental Draft EIS (RDEIR/SDEIS) is currently being developed by DWR, Reclamation, USFWS, and NMFS. The RDEIR/SDEIS will evaluate new alternatives in addition to the alternatives included in the Public Draft EIR/EIS that combine ecosystem restoration approaches and Delta conveyance approaches. During the last 50 years, several broad conveyance approaches have been studied to address urban water quality, water supply reliability, and environmental concerns in the Delta: physical barriers, hydraulic barriers, through-Delta facilities, and isolated facilities.

Several alternative Delta conveyance facilities are being evaluated as part of the EIR/EIS process. Among these alternatives are use of an isolated facility that would convey water around or under the Delta for local supply and export through a hydraulically isolated channel or pipeline and with continual use of the existing south Delta intakes (dual conveyance alternatives); and continuation of the use of the through-Delta conveyance with channel modifications

3.5.1.3 Shasta Lake Water Resources Investigation

The Shasta Lake Water Resources Investigation is currently being conducted by Reclamation to determine the type and extent of federal interest in a multiple purpose plan to modify Shasta Dam and Reservoir to increase the survival of anadromous fish populations in the upper Sacramento River; increase water supplies and water supply reliability for agricultural, municipal, industrial, and environmental purposes (Reclamation 2013d). To the extent possible through meeting these objectives, alternatives include features to benefit other identified water and related resource needs including ecosystem conservation and enhancement, improve hydropower generation capability, flood damage reduction, maintain and increase recreation opportunities, and maintain or improve water quality conditions in the Sacramento River and the Delta consistent with the objectives of the CALFED Bay-Delta Program. Anticipated alternatives for expansion of Shasta Lake include, among other features, raising the dam from 6.5 to 18.5 feet above current elevation, which would result in additional storage capacity of 256,000 to 634,000 acre-feet, respectively. The increased capacity is expected to improve water supply reliability and increase the cold water pool, which would provide improved water temperature conditions for anadromous fish in the Sacramento River downstream of the dam.

3.5.1.4 North of Delta Offstream Storage Investigation

The North-of-the-Delta Offstream Storage Investigation evaluates the feasibility of offstream storage in the northern Sacramento Valley for improved water supply and water supply reliability, improved water quality, and enhanced survival of anadromous fish and other aquatic species (DWR 2013). Specific primary planning objectives are to: 1) increase water supplies to meet existing contract requirements, including improved water supply reliability, and provide greater flexibility in water management for agricultural, environmental, and municipal and industrial users; 2) increase the survival of anadromous fish populations in the Sacramento River, as well as the survivability of other aquatic species; and 3) improve drinking water quality in the Delta. To the extent possible through meeting these objectives, alternatives include ecosystem conservation and enhancement, provide ancillary hydropower generation capability to the statewide power grid, and create incremental flood damage reduction opportunities in support of major northern California flood-control reservoirs consistent with the objectives of the CALFED Bay Delta Program. All alternatives include construction of a dam and reservoir near Sites, located to the west of Maxwell (California), with various facilities and configurations for conveyance into and out of the reservoir, which would result in additional storage capacity ranging

from 1200 to 1900 TAF.

3.5.1.5 Federal Energy Regulatory Commission License Renewals

There are 22 hydroelectric generation FERC permits that will expire prior to 2030 (FERC 2015). Fifteen projects in the Sacramento River watershed include one on the Pit River (upstream of Shasta Lake), six on the Feather River, four on the Yuba River, one on the Bear River, one on the American River, and one each on Cow and Battle creeks. Projects in the San Joaquin River watershed include four on the San Joaquin River, one on the Stanislaus River, two on the Merced River, and one on the Tuolumne River. The FERC must complete analyses under NEPA and ESA to consider the effects of the hydropower operations on the environment, including flow regimes, water quality, fish passage, recreation, aquatic and riparian habitat, and special status species.

3.5.1.5.1 Federal Energy Regulatory Commission License Renewal for SWP Oroville Project

The Oroville Facilities, as part of SWP, are also operated for flood management, power generation, water quality improvement in the Delta, recreation, and fish and wildlife enhancement. The objective of the relicensing process was to continue operation and maintenance of the Oroville Facilities for electric power generation, along with implementation of any terms and conditions to be considered for inclusion in a new FERC hydroelectric license. The initial FERC license for the Oroville Facilities, issued on February 11, 1957, expired on January 31, 2007. The Final EIR/EIS were completed in 2007 (FERC 2007). At this time, the revised BOs and FERC license have not been issued.

3.5.1.5.2 Federal Energy Regulatory Commission Relicensing for Yuba River Watershed Hydroelectric Projects

The Nevada Irrigation District is applying for a new license for the Yuba-Bear Project (FERC Project No. 2266), and PG&E are applying for the Drum-Spaulding Project (FERC Project No. 2310). The Yuba-Bear Project is located on the Middle and South Yuba rivers, Bear River, and Jackson and Canyon creeks (FERC 2013). Concurrently, PG&E is applying for a license renewal for the Drum-Spaulding Project which is located on the Bear and Yuba rivers. Operations of the two projects are coordinated in many factors. The FERC relicensing processes for these two projects is underway.

3.5.1.6 El Dorado Water and Power Authority Supplemental Water Rights Project

The El Dorado Water and Power Authority (EDWPA) proposes to establish permitted water rights allowing diversion of water from the American River basin to meet planned future water demands in the El Dorado Irrigation District and Georgetown Divide Public Utility District service areas and other areas located within El Dorado County that are outside of these service areas. The EDWPA filed petitions with the SWRCB for partial assignment of State Filed Applications 5644 and 5645, and accompanying applications allowing for the total withdrawal

and use of 40,000 acre-feet per year, consistent with the diversion and storage locations allowed under the El Dorado-Sacramento Municipal Utility District Cooperation Agreement (EDWPA 2010).

3.5.1.7 Semitropic Water Storage District Delta Wetlands

In 1987, Delta Wetlands, a California Corporation, proposed a project for water storage and wildlife habitat enhancement on four privately owned islands in the Delta. The four islands were Bacon Island and Bouldin Island in San Joaquin County and Holland Tract and Webb Tract in Contra Costa County, encompassing approximately 23,000 acres. The Delta Wetlands Project would store water on two Reservoir Islands (Bacon Island and Webb Tract) for subsequent release into the Delta, and habitat enhancement to compensate for wetland and wildlife effects of the water storage operations with a Habitat Management Plan on two Habitat Islands (Bouldin Island and Holland Tract).

In 2007, the Delta Wetlands Project partnered with the Semitropic Water Storage District (Semitropic WSD) to: 1) provide water to Semitropic WSD to augment its water supply, and 2) bank water within the Semitropic Groundwater Storage Bank and Antelope Valley Water Bank. The designated places of use for Delta Wetlands Project water would include: Semitropic WSD; Member Agencies of the Metropolitan Water District of Southern California, the Western Municipal Water District of Riverside County, and select service areas of the Golden State Water Company. The project would include improvements of 27 miles of levees and screened diversions to divert water during high-flow periods in the winter months of December through March into Webb Tract (100,000 acre-feet of storage) and Bacon Island (115,000 acre-feet of storage). The water would not be diverted in a manner that would adversely affect senior legal water rights holders, including the SWP and CVP. Stored water would be discharged into False River (from Webb Tract) and Middle River (from Bacon Island) for export when excess SWP or CVP diversion capacity is available, in the summer and fall months of July through November. Any water that could not be exported from the Delta in a given year would be available to increase Delta outflow in the fall months of September through November. Semitropic WSD issued a Draft EIR in 2010 and a Final EIR in 2011 (SWSD 2011).

3.5.1.8 North Bay Aqueduct Alternative Intake

DWR is evaluating the implementation of an alternative intake on the Sacramento River upstream of the Sacramento Regional Wastewater Treatment Plant, and conveyance facility to connect the intake with the existing North Bay Aqueduct. The proposed alternative intake would be operated in conjunction with the existing North Bay Aqueduct intake at Barker Slough. The proposed project would be designed to improve water quality and to provide reliable deliveries of SWP supplies to its contractors, the Solano County Water Agency and the Napa County Flood Control and Water Conservation District (DWR 2011).

The proposed project would include construction and operation of a 240 cfs capacity intake with state-of-the-art positive barrier fish screens, pumping plant,

sediment basins, and ancillary support facilities located on the west side of the Sacramento River near south Sacramento. The conveyance facility would include an approximately 30 mile long, 72 to 84-inch diameter underground steel and/or concrete pipeline to convey the water from the alternate intake to the existing North Bay Aqueduct. Two options are proposed for the location of the alternate intake facility. Alternate intake site 1 is located on the outside edge of Garcia Bend of the Sacramento River (on the west bank), approximately 500 feet south of the boundary of the City of West Sacramento. Alternate intake site 2 is located immediately south of the outside edge of Garcia Bend of the Sacramento River (on the west bank), approximately 2,500 feet south of the boundary of the City of West Sacramento. The intake and pumping plant facility would be constructed on the water side of the Sacramento River levee and the remaining components would be constructed on the land side of the levee. The intake would extend about 100 feet from the top of the levee into the river. The exact amount of this extension would depend on the site option selected. A fish screen would be installed on the face of the intake structure to prevent fish from swimming or being drawn into the intake and it would be designed to meet CDFW, NMFS, and USFWS criteria. The dimensions of the fish screen would be based on an anticipated approach velocity of 0.2 feet per second at the fish screen. Flow-control louvers behind the screen would control flow rates through the screen to assure uniform water velocity across the screen. Normal operation would keep the top of the screen below low water elevation. A reduction in pumping would occur any time the screens are not submerged or the water velocities increased. Above the screen would be concrete panels which extend to the 200 year flood elevation. A log boom would be installed in front of the fish screen to block large debris from blocking or damaging the intake. The intake would be equipped with an automatic fish screen cleaning system.

3.5.1.9 Los Vaqueros Reservoir Expansion Phase 2

Los Vaqueros Reservoir is an off-stream reservoir in the Kellogg Creek watershed to the west of the Delta. The Los Vaqueros Reservoir initial construction was completed in 1997 as a 100 TAF off-stream storage reservoir owned and operated by Contra Costa Water District to improve delivered water quality and emergency storage reliability to their customers. In 2012, the Los Vaqueros Reservoir was expanded to a total storage capacity of 160,000 acre-feet (Phase 1) to provide additional water quality and supply reliability benefits, and to adjust the timing of its Delta water diversions to accommodate the life cycles of Delta aquatic species, thus reducing species impact and providing a net benefit to the Delta environment. As part of the Storage Investigation Program described in the CALFED Bay Delta Program Record of Decision, additional expansion up to 275 TAF (Phase 2) is being evaluated by Contra Costa Water District, DWR, and Reclamation. The alternatives considered in the evaluation also consider methods to convey water from Los Vaqueros Reservoir to the South Bay Aqueduct to provide water to Zone 7 Water Agency, Alameda County Water District, and Santa Clara Valley Water District (Reclamation, CCWD, and Western 2010).

3.5.1.10 Upper San Joaquin River Basin Storage Investigation

The Upper San Joaquin River Basin Storage Investigation is being conducted by Reclamation and DWR to evaluate alternative plans to increase Upper San Joaquin River Storage to enhance the San Joaquin River restoration efforts and improve water supply reliability for agricultural, municipal and industrial, and environmental uses in the Friant Division, the San Joaquin Valley, and other regions of the state. The investigation is evaluating integration of conjunctive management and water transfer concepts into plan formulations. Additional storage is also expected to provide incidental flood damage reduction benefits (Reclamation 2014c).

Reclamation is analyzing alternatives for a new dam and a 1,260 TAF reservoir along the San Joaquin upstream of Millerton Lake in an area known as Temperance Flat. Primary planning objectives are to: 1) increase water supply reliability, and 2) enhance flow and temperature conditions to support the San Joaquin River Restoration Program. Operation variables include reservoir carryover, new or shifting water supply beneficiaries, and alternative conveyance routes.

3.5.1.11 FERC Relicense Renewal for Turlock Irrigation District and Modesto Irrigation District Don Pedro Project

The Don Pedro Project is located on the Tuolumne River in Tuolumne County. The initial license was issued for operations between 1971 and 1991 followed by requirements to evaluate fisheries water needs in the Tuolumne River.

In 1987, after the Turlock Irrigation District and Modesto Irrigation District applied to amend their license to add a fourth generating unit, FERC approved an amended fish study plan with possible changes in 1998. In 1996, FERC amended the license to implement amended minimum flow criteria and require fish monitoring studies for completion in 2005. In 2002, NMFS requested that FERC initiate formal consultation on the effects of the Don Pedro Project on Central Valley steelhead. The FERC approved the Summary Report on fisheries in 2008. In 2009, NMFS, USFWS, CDFW, and several environmental interest groups filed requests for rehearing on the license. FERC denied portions of the request but required instream flow studies to be conducted and required NMFS to be included for consultation on any authorized changes to minimum flow release schedules.

The FERC also directed the appointment of an administrative law judge to assist in assessing the need for and feasibility for interim measures prior to relicensing. A final report was completed in 2010. Following the completion of the report and a monitoring plan by the affected districts, FERC approved an order modifying and approving instream flow and monitoring study plans. The current license expires in 2016.

The objective of the relicensing process is to continue operation and maintenance of the Don Pedro Project facilities for electric power generation, along with implementation of any terms and conditions to be considered for inclusion in a new FERC hydroelectric license.

3.5.1.12 FERC Relicense Renewal for Merced Irrigation District's Merced River Hydroelectric Project

The Merced River Hydroelectric Project is located on the Merced River in Mariposa County and includes both Lake McClure and McSwain Reservoir, two powerhouses (New Exchequer and McSwain), and recreation facilities. The initial FERC license expires on February 28, 2014. The objective of the relicensing process is to continue operation and maintenance of the Merced River Hydroelectric Project facilities for electric power generation, along with implementation of any terms and conditions to be considered for inclusion in a new FERC hydroelectric license (Merced ID 2013).

3.5.1.13 Central Valley RWQCB Irrigated Lands Regulatory Program

The Irrigated Lands Regulatory Program regulates discharges from irrigated agricultural lands. Its purpose is to prevent agricultural discharges from impairing the waters that receive the discharges. The California Water Code authorizes the SWRCB and Regional Water Quality Control Boards to conditionally waive waste discharge requirements if this is in the public interest. On this basis, the Los Angeles, Central Coast, Central Valley, and San Diego regional water quality control boards have issued conditional waivers of waste discharge requirements to growers that contain conditions requiring water quality monitoring of receiving waters. In 2010, the Central Valley Regional Water Quality Control Board proposed to expand the requirements to groundwater especially for regulation of discharges with higher concentrations of nutrients (CVRWQCB 2011). Participation in the waiver program is voluntary; however, non-participant dischargers must file a permit application as an individual discharger, stop discharging, or apply for coverage by joining an established coalition group. The waivers must include corrective actions when impairments are found.

3.5.1.14 San Luis Reservoir Low Point Improvement Project

The San Luis Reservoir Low Point Improvement Project is proposed by Reclamation, the Santa Clara Valley Water District, and the San Luis and Delta Mendota Water Authority. As part of this project, Reclamation is investigating three alternatives to address the water quality problems within the CVP's San Felipe Division (Santa Clara and San Benito counties) that arise when San Luis Reservoir levels drop below 300,000 acre-feet during late summer in dry water years, resulting in large algal blooms. The alternatives being considered are to 1) expand the 6,000 acre-feet Pacheco Reservoir to 80,000 acre-feet or 130,000 acre-feet, 2) lower the San Felipe Intake at San Luis Reservoir, or 3) implement a combination comprehensive plan. The combination comprehensive plan would involve increasing groundwater recharge and recovery capacity, implementing desalination measures, re-operating Santa Clara Valley Water District's raw- and treated-water systems, and implementing institutional measures. If Pacheco Reservoir were to be enlarged, the reservoir would be filled with Delta water; thus, additional impacts on Delta aquatic species (e.g., juvenile salmonids and Delta Smelt) could result from an increase in Delta exports. The environmental

scoping report for the San Luis Reservoir Low Point Improvement Project was released in January 2009 and the plan formulation report was published in January 2011 (Reclamation et al. 2011).

3.5.1.15 Future Water Supply Projects

Many of the future projects would directly increase regional and local water supplies through groundwater storage and recovery programs, improved conveyance that connects water supplies from different water agencies, recycled water projects, and desalination projects. Water resources projects that have been approved and are being implemented were previously described in this chapter under the No Action Alternative. The following major water supply projects are currently being evaluated and are considered under the Cumulative Effects analysis.

- Future Groundwater Storage and Recovery Projects
 - City of Roseville (City of Roseville 2012)
 - Mokelumne River Water & Power Authority (MORE 2015)
 - Northeastern San Joaquin County Groundwater Banking Authority (NSJCGBA 2011)
 - Stockton East Water District (SEWD 2012)
 - Madera Irrigation District (Reclamation 2011b)
 - Kings River Conservation District (KRCD 2012b)
 - Buena Vista Water Storage District and Rosedale Rio Bravo Water Storage District (BVWSD 2015)
 - City of Los Angeles (City of Los Angeles 2010, 2013b)
 - Los Angeles County (Los Angeles County 2013b)
 - City of San Diego (City of San Diego 2009a, 2009b)
 - Rancho California Water District (RCWD 2011, 2012)
 - Eastern Municipal Water District (EMWD 2014c)
 - Jurupa Community Services District (JCSD et al. 2010)
- Major Conveyance Projects
 - Bay Area Regional Water Supply Reliability (CCWD 2014, EBMUD 2014)
 - Friant-Kern Canal and Madera Canal Capacity Restoration Projects (SJRRP 2011, 2015)
 - Los Banos Creek Water Resources Management Plan (SJRECWA 2012)
- Major Recycle Water Projects (more than 10,000 acre-feet/year)
 - City of Fresno (City of Fresno 2011)

- City of Los Angeles (City of Los Angeles 2005)
- Central Basin Municipal Water District (CBMWD 2010)
- Foothill Municipal Water District (MWDSC 2010)
- Upper San Gabriel Valley Municipal Water District (USGVMWD 2013)
- West Basin Municipal Water District (WBMWD 2011, 2015a)
- Olivenhain Municipal Water District (OMWD 2015)
- Eastern Municipal Water District (EMWD 2014c)
- Inland Empire Utilities Agency (IEUA 2014)
- Palmdale Water District (PWD 2010)
- East Valley Water Reclamation Authority (Antelope Valley 2013)
- Major Future Coastal Desalination Water Projects
 - San Francisco Bay Area Regional Desalination Project (BARDP 2015)
 - City of Santa Barbara (City of Santa Barbara 2015)
 - Camrosa Water District (CWD 2015)
 - City of Long Beach (City of Long Beach 2015)
 - City of Huntington Beach (City of Huntington Beach 2010)
 - City of Oceanside (City of Oceanside 2012)
 - City of Carlsbad (City of Carlsbad 2006)
 - West Basin Municipal Water District (WBMWD 2015b)
 - Metropolitan Water District of Orange County (MWD OC 2015)
 - San Diego County Water Authority in the Southern California Region (SDCWA 2009, 2015)

3.5.2 Ecosystem Improvement Projects and Actions

There are numerous ecosystem improvement projects and actions that could be potentially affected by changes in the coordinated long-term operation of the CVP and SWP, or could affect the CVP and SWP operations. Major future water supply and water quality projects and actions are discussed below.

3.5.2.1 Mill Creek Riparian Assessment

The need to restore and maintain riparian habitat in Mill Creek is identified in the Anadromous Fish Restoration Program and CALFED Bay-Delta Ecosystem Restoration Program goals, objectives, and targets. The AFRP is one of five CVPIA programs that have been integrated with the Ecosystem Restoration Plan. Both of these programs prioritize establishment, restoration, and maintenance of anadromous fish habitat on this stream, particularly in the arena of riparian habitat and flow enhancement. In response to this identified need, Reclamation and

USFWS is implementing the Mill Creek Riparian Assessment. The project includes: 1) riparian habitat and condition mapping and vegetation classification of the Mill Creek watershed, 2) identifying and prioritizing areas that should be restored, enhanced, and/or preserved in addition to existing conservation easements, and 3) identifying the types of restoration actions that should occur at the prioritized sites (USFWS 2010).

3.5.2.2 Yolo County Habitat/Natural Community Conservation Plan

The Yolo County Habitat Joint Powers Authority, consisting of five local public agencies, launched the Yolo Natural Heritage Program in March 2007. This effort includes the continuing preparation of a joint Habitat Conservation Plan/Natural Community Conservation Plan (HCP/NCCP). Member agencies include Yolo County and the cities of Davis, Woodland, West Sacramento, and Winters.

The HCP/NCCP describes the measures that local agencies will implement to conserve biological resources, obtain permits for urban growth and public infrastructure projects, and continue to maintain the agricultural heritage and productivity of Yolo County. The nearly 653,820-acre planning area provides habitat for covered species occurring within five dominant habitats/natural communities. The plan proposes to address 63 covered species, including seven state-listed species: palmate-bracted bird's-beak, Colusa grass, Crampton's tuctoria, giant garter snake, Swainson's hawk, western yellow-billed cuckoo, and bank swallow. Interim conservation activities include acquiring permanent conservation easements for sensitive species habitat in the plan area (YNHP 2015).

3.5.2.3 North Delta Flood Control and Ecosystem Restoration Project

The North Delta Flood Control and Ecosystem Restoration Project is proposed near the confluence of the Cosumnes and Mokelumne rivers by the DWR and encompasses approximately 197 square miles. Consistent with objectives contained in the CALFED Record of Decision, the project is intended to improve flood management and provide ecosystem benefits in the North Delta area through actions such as construction of setback levees and configuration of flood bypass areas to create quality habitat for species of concern. These actions are focused on McCormack-Williamson Tract and Staten Island. The project would implement flood control improvements in a manner that benefits aquatic and terrestrial habitats, species, and ecological processes. Flood control improvements are needed to reduce damage to land uses, infrastructure, and the Bay-Delta ecosystem resulting from overflows caused by insufficient channel capacities and catastrophic levee failures in the 197 square-mile project study area. The proposed project as described in the Final EIR (DWR 2010b) included: portions of the levee system degraded to allow controlled flow across McCormack-Williamson Tract; levee modification to mitigate hydraulic impacts; channel dredging to increase flood conveyance capacity; an off-channel detention basin on Staten Island; ecosystem restoration where floodplain forests and marshes would be developed at McCormack-Williamson Tract and the Grizzly Slough property; setback levee on Staten Island to expand the floodway

conveyance; and opening up the southern portion of McCormack-Williamson Tract to boating; improving Delta Meadows property; providing access and interpretive kiosks for wildlife viewing; and providing restroom, circulation, parking, and signage infrastructure to support such uses.

3.5.2.4 Franks Tract Project

Reclamation is conducting studies to evaluate the feasibility of modifying the hydrodynamic conditions near Franks Tract to improve Delta water quality and enhance the aquatic ecosystem. The results of these studies have indicated that modifying the hydrodynamic conditions near Franks Tract may substantially reduce salinity in the Delta and protect fishery resources, including populations of Delta Smelt. Reclamation is evaluating installing operable gates to control the flow of water at key locations (Threemile Slough and/or West False River) to reduce sea water intrusion, and to positively influence movement of fish species of concern to areas that provide favorable habitat conditions. The project gates would be operated seasonally and during certain hours of the day, depending on fisheries and tidal conditions. Boat passage facilities would be included to allow for passing of watercraft when the gates are in operation. The Franks Tract Project is consistent with ongoing planning efforts for the Delta to help balance competing uses and create a more sustainable system for the future. By protecting fish resources, this project also could improve operational reliability of the CVP and SWP because curtailments in water exports (pumping restrictions) are likely to be less frequent. Franks Tract was previously evaluated as part of DWR's Flooded Island Pre-Feasibility Study Report (DWR 2007).

3.6 References

- Antelope Valley. 2013. *Antelope Valley Integrated Regional Water Management Plan, Final, 2013 Update*.
- AVEK (Antelope Valley-East Kern Water Agency). 2011b. *Water Supply Stabilization Project No. 2 Implementation Grant Proposal*. AVRWC (Apple Valley Ranchos Water Company). 2011. *2010 Urban Water Management Plan*. June 23.
- BARDP (Bay Area Regional Desalination Project). 2015. *About the Project, Schedule*. Site accessed January 12, 2015. <http://www.regionaldesal.com/schedule.html>
- BCDC (Bay Conservation and Development Commission). 2011. *Draft Staff Report, Living with a Rising Bay: Vulnerability and Adaptation in San Francisco Bay and on its Shoreline, As Revised Through September 23, 2011*. September 23.
- Carlsbad MWD (Carlsbad Metropolitan Water District). 2012. *Approval of a Mitigated Negative Declaration for Carlsbad Municipal Water District Phase III Recycled Water Project, Draft Initial Study/Mitigated Negative Declaration*. November 27.

- CBMWD (Central Basin Municipal Water District). 2011. *Draft, 2010 Urban Water Management Plan*. March.
- CBMWD (Central Basin Municipal Water District). 2011. *Initial Study, Central Basin Groundwater Storage Plan: A Blueprint for Future Reliability*. February.
- CCSD (Cambria Community Services District). 2014. *Cambria Emergency Water Supply Project*. June.
- CCWD (Contra Costa Water District). 2014. *Bay Area Regional Water Supply Reliability Presentation*. November 18.
- CDFW (California Department of Fish and Wildlife Service). 2015. *CDFW Completes Drought Related Restoration Project at Lindsey Slough, Solano County*. Site accessed June 1, 2015. <https://cdfgnews.wordpress.com/2014/12/19/cdfw-completes-drought-related-restoration-project-at-lindsey-slough-solano-county/>
- CDFW and DWR (California Department of Fish and Wildlife Service and California Department of Water Resources). 2013. *DRERIP Evaluation for Prospect Island Restoration Design Alternatives, Summary of a two-day workshop held at UC Davis, October 24-25, 2102*. February.
- City of Carlsbad. 2006. *California Environmental Quality Act (CEQA) Addendum City of Carlsbad, California Precise Development Plan and Desalination Plant Project, Final Environmental Impact Report*. June 13.
- City of Fresno. 2011. *City of Fresno Recycled Water Master Plan, Final Environmental Impact Report*. June.
- City of Huntington Beach. 2010. *Draft Subsequent Environmental Impact Report, Seawater Desalination Project at Huntington Beach*. May.
- City of Long Beach. 2015. *Capital Projects, Seawater Desalination*. Site accessed January 12, 2015. <http://www.lbwater.org/overview-long-beach-seawater-desalination-project>
- City of Los Angeles (Los Angeles Department of Water and Power). 2005. *Integrated Resources Plan, Draft Environmental Impact Report*. November.
- City of Los Angeles (Los Angeles Department of Water and Power). 2011. *Urban Water Management Plan, 2010*. May 3.
- City of Los Angeles. 2013a. *Tujunga Spreading Grounds Enhancement Project, Final Environmental Impact Report*. April.
- City of Los Angeles (Los Angeles Department of Water and Power). 2013b. *Initial Study, Los Angeles Groundwater Replenishment Project*. September.
- City of Oxnard. 2013. *GREAT Program Update, City Council Report, December 10, 2013, Draft*. November 22.

- City of Roseville. 2012. *Aquifer Storage and Recovery Program Final Environmental Impact Report*. March.
- City of San Diego. 2009a. *Mission Valley Basin*. September 11.
- City of San Diego. 2009a. *San Pasqual Basin*. September 11.
- City of Santa Barbara. 2015. *Desalination*. Site accessed February 19, 2015.
<http://www.santabarbaraca.gov/gov/depts/pw/resources/system/sources/desalination.asp>
- CVRWQCB (Central Valley Regional Water Quality Control Board). 2011. *Irrigated Lands Regulatory Program, Program Environmental Impact Report*. March.
- CVRWQCB (Central Valley Regional Water Quality Control Board). 2015.. *CV-SALTS, Central Valley Salinity Alternatives for Long-Term Sustainability*. Site accessed April 29, 2015.
http://www.waterboards.ca.gov/centralvalley/water_issues/salinity/
- CWD (Camarosa Water District). 2015. *Local Water Desalination*. Site accessed January 25, 2015. http://www.camrosa.com/self_reliance_lwd.html
- DWR (California Department of Water Resources). 2007. *Value Engineering Study, Franks Tract Pilot Project, Final Report*. June.
- DWR (California Department of Water Resources). 2010a. *Final Report, Stockton Deep Water Ship Channel, Demonstration Dissolved Oxygen Aeration Facility Project*. December.
- DWR (California Department of Water Resources). 2010b. *Final Environmental Impact Report, North Delta Flood Control and Ecosystem Restoration Project*. October.
- DWR (California Department of Water Resources). 2011. *Scoping Report, North Bay Aqueduct Alternative Intake Project*. February.
- DWR (California Department of Water Resources). 2013. *North-of-the-Delta Offstream Storage Preliminary Administrative Draft Environmental Impact Report*. December.
- DWR and Reclamation (California Department of Water Resources and Bureau of Reclamation). 2014. *Draft Technical Information for Preparing Water Transfer Proposals (Water Transfer White Paper), Information for Parties Preparing Proposals for Water Transfers Requiring Department of Water Resources or Bureau of Reclamation Approval*. November.
- DWR and SWRCB (California Department of Water Resources and State Water Resources Control Board). 2014. *2012/2013 Transfer Activity*. January 28.
- DWR, Reclamation, USFWS and NMFS (California Department of Water Resources, Bureau of Reclamation, U.S. Fish and Wildlife Service, and National Marine Fisheries Service). 2013. *Draft Environmental Impact Report/Environmental Impact Statement for the Bay Delta Conservation*

Plan. November.

- EBMUD (East Bay Municipal Utility District). 2014. *Memo to the Board of Directors, Bay Area Regional Reliability Principles*. May 8.
- EDWPA (El Dorado Water and Power Authority). 2010. *Supplemental Water Rights Project, Acquisition of 40,000 Acre-Feet Per Year of New Consumptive Water Draft Environmental Impact Report*. July 15.
- EMWD (Eastern Municipal Water District). 2014a. *Administrative Draft, Mitigated Negative Declaration, Temecula Valley Regional Water Reclamation Facility, 23 MGD Expansion*. January.
- EMWD (Eastern Municipal Water District). 2014b. *San Jacinto Regional Water Reclamation Facility*. March.
- EMWD (Eastern Municipal Water District). 2014c. *Indirect Potable Reuse Program*. January 8.
- EMWD (Eastern Municipal Water District). 2014c. *Hemet/San Jacinto Groundwater Management Area, 2013 Annual Report, Prepared for Hemet-San Jacinto Watermaster*. April.
- FERC (Federal Energy Regulatory Commission). 2007. Final Environmental Impact Statement for Hydropower License, Oroville Facilities, FERC Project No. 2100-052, California.
- FERC (Federal Energy Regulatory Commission). 2012. *Draft Environmental Impact Statement for Hydropower License, Middle Fork American River Hydroelectric Project – FERC Project No. 2079-069*. July.
- FERC (Federal Energy Regulatory Commission). 2013. Draft Environmental Impact Statement for for the Drum-Spaulding Hydroelectric Project (Project No. 2310-193) and Yuba-Bear Hydroelectric Project (Project No. 2266-102). May.
- FERC (Federal Energy Regulatory Commission). 2015. *FERC: Hydropower-General Information – Licensing*. Site accessed April 29, 2015. <http://www.ferc.gov/industries/hydropower/gen-info/licensing.asp>
- FID (Fresno Irrigation District). 2015. *FID Pond Measurement – State of California DWR LGA Grant*. Site accessed February 13, 2015. <http://www.fresnoirrigation.com/index.php?c=36>
- IEUA (Inland Empire Utilities Agency). 2014. *Inland Empire Utilities Agency, 2013/14 Recycled Water Annual Report*.
- IEUA (Inland Empire Utilities Agency). 2015. *Draft Fiscal Year 2015/16 Ten-Year Capital Improvement Plan*. January
- JCSD et al. (Jurupa Community Services District, City of Ontario, Western Municipal Water District). 2010. *Chino Desalter Phase 3*. December.
- KEYT (KEYT News). 2015. *Santa Barbara Desalination Plant Permit Approved*. Site accessed February 19, 2015. <http://www.keyt.com/news/santa-barbara->

desal-plant-permit-approved/31055434

KRCD (Kings River Conservation District). 2012. *Sustainable Groundwater Management through an Integrated Regional Water Management Plan (IRWMP)*.

LACSD (Los Angeles County Sanitation District). 2005. *Final Palmdale Water Reclamation Plant 2025 Plan and Environmental Impact Report*. September.

Los Angeles County (County of Los Angeles). 2013. *Press Release, LA County Flood Control District Tapped to Receive \$28 Million State Flood Protection, Water Supply Grant*. October 3.

Merced ID (Merced Irrigation District). 2015. *The Public Website for Relicensing of Merced Irrigation District's Merced River Hydroelectric Project, FERC Project No. 2179*. Site accessed January 13, 2015.
http://www.eurekasw.com/mid/default.aspx?Paged=Next&p_StartTimeUTC=20131129T1...

MID/TID (Modesto Irrigation District and Turlock Irrigation District). 2015. *Don Pedro Project Relicensing*. Site accessed January 13, 2015.
[http://www.donpedro-relicensing.com/default.aspx\[1/13/2015 1:45:20 PM\]](http://www.donpedro-relicensing.com/default.aspx[1/13/2015 1:45:20 PM])

MORE (Mokelumne River Water & Power Authority). 2015. *Status and Timeline*. Site accessed January 14, 2015.
http://www.morewater.org/about_project/status_timeline.html

MWDOC (Metropolitan Water District of Orange County). *Doheny Desalination Project*. Site accessed January 12, 2015.
<http://www.mwdoc.com/services/dohenydesalhome>

MWDSC (Metropolitan Water District of Southern California). 2010. *Integrated Water Resources Plan, 2010 Update*. October.

NMFS (National Marine Fisheries Service). 2013. *Biological Opinion, Dutch Slough Tidal Marsh Restoration Project*. February 7.

NRC (National Research Council of the National Academies). 2012. *Sustainable Water and Environmental Management in the California Bay-Delta*. Washington D.C. http://www.nap.edu/catalog.php?record_id=13394.

NSJCGBA (Northeastern San Joaquin County Groundwater Banking Authority). 2011. *Eastern San Joaquin Basin Integrated Conjunctive Use Program Programmatic Environmental Impact Report*. February.

OMWD (Olivenhain Municipal Water District). 2015. *North County Recycled Water Project on Track to Receive Millions More in State Grant Funds*. Site accessed February 16, 2015.
<http://www.olivenhain.com/component/content/article/3-news/236-north-county-recycled-water-project-on-track-to-receive-millions-more-state-grant-funds>.

- PWD (Palmdale Water District). 2010. *Strategic Water Resources Plan, Final Report*. March.
- RCWD (Rancho California Water District). 2011. *2010 Urban Water Management Plan Update*. June 30.
- RCWD (Rancho California Water District). 2012. *Agricultural Water Management Plan*. December 13.
- RD 2093 (Reclamation District 2093). 2011. *Northern Liberty Island Fish Conservation Bank, Final Initial Study/Mitigated Negative Declaration, SCH#2010122078*. February 2011.
- Reclamation (Bureau of Reclamation). 2004. *Implementation of the Central Valley Project Improvement Act, 10 Years of Progress, Fiscal Years 1993-2002*. May.
- Reclamation (Bureau of Reclamation). 2014d. *Lower American River Salmonid Spawning Gravel Augmentation and Side-Channel Habitat Establishment Program Final Environmental Assessment*. August.
- Reclamation (Bureau of Reclamation). 2009. *Record of Decision, Grassland Bypass Project, 2010-2019*. December.
- Reclamation (Bureau of Reclamation). 2010. *Draft Environmental Assessment, Antelope Valley Water Bank Initial Recharge and Recovery Facilities Improvement Project*. January.
- Reclamation (Bureau of Reclamation). 2011a. *Draft CVPIA Fiscal Year 2012 Annual Work Plan, Clear Creek Restoration – CVPIA Section 3406(b)(12)*. December 9.
- Reclamation (Bureau of Reclamation). 2011b. *Record of Decision Madera Irrigation District Water Supply Enhancement Project*. July.
- Reclamation (Bureau of Reclamation). 2012. *Record of Decision San Joaquin River Restoration Program*. September 28.
- Reclamation (Bureau of Reclamation). 2013a. *Clear Creek Restoration Program, Public Meeting*.
- Reclamation (Bureau of Reclamation). 2013b. *Record of Decision, Water Transfer Program for the San Joaquin River Exchange Contractors Water Authority, 2014-2038*. July 30.
- Reclamation (Bureau of Reclamation). 2013c. *2013 CVPIA Draft Annual Work Plans – Introduction*.
- Reclamation (Bureau of Reclamation). 2013d. *Shasta Lake Water Resources Investigation Draft Environmental Impact Statement*. June.
- Reclamation (Bureau of Reclamation). 2014a. *Record of Decision, Suisun Marsh Habitat Restoration, Preservation, and Management Plan*. April 21.
- Reclamation (Bureau of Reclamation). 2014b. *Long-Term Water Transfers*

Environmental Impact Statement/Environmental Impact Report, Public Draft. September.

Reclamation (Bureau of Reclamation). 2014c. *Upper San Joaquin River Basin Storage Investigation, Draft Environmental Impact Statement.* August.

Reclamation (Bureau of Reclamation). 2014d. *Santa Clara Valley Water District California Aqueduct Reverse Flow Project.* October.

Reclamation (Bureau of Reclamation). 2014e. *Lower American River Salmonid Spawning Gravel Augmentation and Side-Channel Habitat Establishment Program – 2014 Nimbus Project, Finding of No Significant Impact.* August.

Reclamation et al. (Bureau of Reclamation, Santa Clara Valley Water District, San Luis and Delta-Mendota Water Authority). 2011. *San Luis Low Point Improvement Project, Plan Formulation Report.* January.

Reclamation and USFWS (Bureau of Reclamation and U.S. Fish and Wildlife Service). 2012. *Spawning and Rearing Habitat Restoration (gravel), CVPIA 3406b(13).*

Reclamation, CCWD, and Western (Bureau of Reclamation, Contra Costa Water District, and Western Area Power Administration). 2010. *Los Vaqueros Expansion Project, Environmental Impact Statement/Environmental Impact Report.* March.

SBCWD (San Benito County Water District). 2014. *West Hills Water Treatment Plant Project, Draft Environmental Impact Report.* January.

SCVWD (Santa Clara Valley Water District). 2012. *2012 Water Supply and Infrastructure Master Plan.* October.

SDCWA (San Diego County Water Authority). 2009. *Camp Pendleton Seawater Desalination Project Feasibility Study.* December.

SDCWA (San Diego County Water Authority). 2014. *Fact Sheet, The Carlsbad Desalination Project.*

SDCWA (San Diego County Water Authority). 2015. *Seawater Desalination.* Site accessed January 12, 2015. <http://www.sdcwa.org/seawater-desalination>

SEWD (Stockton East Water District). 2012. *Farmington Groundwater Recharge Program.* Site accessed November 30, 2012. <http://www.farmingtonprogram.org/index.html>

SFCWA (State and Federal Contractors Water Agency). 2011. *Two Years Old: Walking and Talking – Poised to Run?* Urban Water Institute: August 25, 2011. August 25, 2011.

SFCWA (State and Federal Contractors Water Agency). 2013. *Lower Yolo Restoration Project, Draft Environmental Impact Report.* April 2013.

SFRRWQCB (San Francisco Bay Region Regional Water Quality Control Board). 2015. *Staff Summary Report, Fairfield-Suisun Sewer District,*

Fairfield-Suisun Wastewater Treatment Plant and Wastewater Collection System, Fairfield, Solano County – Reissuance of NPDES Permit. March 11.

- SJRECWA (San Joaquin River Exchange Contractors Water Authority). 2012. *Los Banos Creek Water Restoration Management Plan, Attachment 4 – Project Description.*
- SJRRP (San Joaquin River Restoration Program). 2011. *Friant-Kern Canal Capacity Restoration, Draft.* June.
- SJRRP (San Joaquin River Restoration Program). 2015. *Madera Canal Capacity Restoration Project.* Site accessed February 21, 2015.
http://restoresjr.net/activities/site_specific/madera-canal/index.html
- SRCSD (Sacramento Regional County Sanitation District). 2012. *Notice of Preparation.* May 7,
- SWRCB (State Water Resources Control Board). 2006. *Water Quality Control Plan for the San Francisco Bay/Sacramento-San Joaquin Delta Estuary.* December 13.
- SWRCB (State Water Resources Control Board). 2012. *Public Draft, Substitute Environmental Document in Support of Potential Changes to the Water Quality Control Plan for the San Francisco Bay-Sacramento/San Joaquin Delta Estuary: San Joaquin River Flows and Southern Delta Water Quality.* December.
- SWSD (Semitropic Water Storage District). 2011. *Delta Wetlands Project Place of Use, Final Environmental Impact Report.* August.
- TRRP (Trinity River Restoration Program, including Bureau of Reclamation, U.S. Fish and Wildlife Service, National Marine Fisheries Service, U.S. Forest Service, Hoopa Valley Tribe, Yurok Tribe, California Department of Water Resources, California Department of Fish and Wildlife, and Trinity County). 2012. *Trinity River Restoration Program 2011 Annual Report.* May.
- TRRP (Trinity River Restoration Program, including Bureau of Reclamation, U.S. Fish and Wildlife Service, National Marine Fisheries Service, U.S. Forest Service, Hoopa Valley Tribe, Yurok Tribe, California Department of Water Resources, California Department of Fish and Wildlife, and Trinity County). 2014. *Typical Releases.* Site accessed September 4, 2014
<http://www.trrp.net/restore/flows/typical/>.
- USACE et al. (U.S. Army Corps of Engineers, Bureau of Reclamation, Sacramento Area Flood Control Agency, and California Central Valley Flood Protection Board). 2012. *Folsom Dam Modification Project Approach Channel, Draft Supplemental Environmental Impact Statement/Environmental Impact Report.* July.
- USEPA (U.S. Environmental Protection Agency). 2008. *Five-Year Review*

Report, Fourth Five-Year Review Report for Iron Mountain Mine Superfund Site, Redding, California. July.

USGVMWD (Upper San Gabriel Valley Municipal Water District). 2013. *Integrated Resources Plan.* January.

USFWS (U.S. Fish and Wildlife Service). 2009. *Finding of No Significant Impact for the Lower Mokelumne River Spawning Habitat Improvement Project.* September 3.

USFWS (U.S. Fish and Wildlife Service). 2010. *Notice of Availability of Federal Assistance 2010 Request for Proposals, Mill Creek.*

VVWRA (Victor Valley Wastewater Reclamation Authority). 2015. *Apple Valley Subregional Water Recycling Plant.* Site accessed January 25, 2015. <http://vvwra.com/index.aspx?page=122>

WBMWD (Western Basin Municipal Water District). 2011. *Edward C. Little Water Recycling Facility Phase V Expansion, Initial Study/Mitigated Negative Declaration.* March.

WBMWD (West Basin Municipal Water District). 2015a. *Water Recycling Satellite Facilities.* Site accessed January 12, 2015. <http://www.westbasin.org/water-reliability-2020/recycled-water/satellite-facilities>

WBMWD (West Basin Municipal Water District). 2015b. *Ocean Water Desalination.* Site accessed January 12, 2015. <http://www.westbasin.org/water-reliability-2020/ocean-water-desalination/overview>

WDCWA (Woodland-Davis Clean Water Agency). 2013. *The Project.* Site accessed February 5, 2013. http://www.wdcwa.com/the_project

WMD (Western Municipal Water District). 2015. *Arlington Desalter.* Site accessed January 19, 2015. <http://wmwd.com/index.aspx?nid=301&PREVIEW=YES>

WRD (Water Replenishment District). 2012. *Notice of Intent to Adopt a Negative Declaration for Leo J. Vanders Lans Water Treatment Facility Expansion Project, Revised March 9, 2012.* March 9.

WRD (Water Replenishment District). 2015. *Recirculated Draft Environmental Impact Report, Groundwater Reliability Improvement Program (GRIP), Recycled Water Project.* April.

WSRCD (Western Shasta Resource Conservation District). 2011. *Lower Clear Creek Aquatic Habitat and Waste Discharge Improvement Project.*

YNHP (Yolo County Natural Heritage Program). 2015. *Yolo Natural Heritage Plan.* Site accessed June 3, 2015. <http://www.yoloconservationplan.org/>

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